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# CARPENTRY AND BUILDING

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## NOTES AND COMMENTS.

THE new year opens with prospects in the building trades quite as good as usual at this season. The remarkably fine autumn which prevailed in almost all sections of the land insured employment to mechanics engaged upon outside work to a very late date, and enabled contractors to inclose many buildings which under less favorable conditions would have remained open until spring. In many cases the fine weather caused improvements to be commenced after a date that usually sees operations very generally suspended. Mechanics enter upon the winter season better prepared for it than usual. The outlook for the spring, so far as can at present be judged, is favorable in almost all sections of the country. The general crops, the financial situation and the price of labor and materials is favorable to building. In New York City building has been very active for the entire year, and will be continued in many cases right through the winter. The spring will probably witness continued activity. We hear favorable reports from Chicago, where a number of large operations are on the tapis, with numerous small enterprises in prospect. In St. Louis the outlook is perhaps less flattering, but still it is not bad. In Pittsburgh a great deal of building is contemplated in the early future. In many sections of the South there promises to be unusual activity in the building trades during the year just beginning. Taken altogether the outlook is favorable in amount of work likely to be done and in the prices to be realized for it.

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ONE of the oldest landmarks in this city has been recently destroyed. The building in question was located at 75 and 77 Nassau street, and dated back to the period when New York was an English colony. It was a two-story brick dwelling when the Old North Dutch Church—afterward the New York Post Office—was built, and perhaps antedates the old Washington Headquarters at the foot of Broadway, on whose site the present Washington Building stands. Three stories were added in 1785, and since then it has passed through all the changes of a century practically unaltered. For some years it has been considered unsafe on account of the shallow foundations, and the owner reluctantly gave orders to have it torn down. As a specimen of the thoroughness and solidity of house-building 100 years ago the half-dismantled walls were extremely interesting. The front stood like a face of rock, the thin bricks and cement-like plaster having become welded into a single mass which the workmen broke with strong cold-chisels and even sledge hammers. The bricks used were all imported from Holland and are about 6½ inches long and 1¼ inches thick. The mortar was made of pure shell lime with almost no clay or sand in it, and forms a third of the solid mass. "I have torn down a great many old houses in New York and Albany," said Edward Sorensen, the contractor, "but I never saw one so well built as this. Why, it's like rock or flint. It will take my men ten times longer to tear down the walls than it would to build new ones. There's no 'Buddensiek' about these old Dutch builders. You can't find anything like that front wall now."

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IN another part of this number we announce a competition in plans, elevations and details of a moderate price frame dwelling. The contest proposed is in some respects unique in character. The decision, instead of being influenced by a stipulated cost of finished structure, is to be based entirely upon the desirability of the studies submitted for publication in this journal. The specification, in brief, is a house suited to the wants of the masses. A very cheap house would not meet the case, and expensive houses suited only to those enjoying generous incomes would also be outside of the lines. The cash prizes named are liberal in amount and will justify careful work upon the part of competitors. We anticipate a very spirited contest.

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SOMETHING over 180 years ago Madam Knight undertook a journey from Boston to New York. The distance was accomplished on horseback under the direction of a hired guide. This means of conveyance as compared with the facilities at the disposal of the modern traveler was in no more striking contrast with what exists at the present time than some things that the good lady records concerning matters that came to her attention while she sojourned in this city. She contrasts the habits of the two cities with respect to their methods of heating and the construction and finish of their fireplaces in a very forcible manner. Altogether she presents a grotesque picture of fireplaces as they existed in this city nearly 200 years since, and our readers will enjoy the quaint phraseology of the good dame's diary relating to this matter, which was published in 1825. She says: "The Cittie of New York is a pleasant, well-compacted place, situated on a commodious River, which is a fine harbor for shipping. The Buildings, Brick Generaly, very stately and high, though not altogether like ours in Boston. The Bricks in some of the houses are of divers Coullers and laid in Checkers, being glazed look very agreeable. The inside of them are neat to admiration, the wooden work, for only the walls are plastered, and the Sumers and Gist are plained and kept very white scowr'd as so is all the partitions if made of Bords. The fireplaces have no Jambs (as ours have) But the Backs run flush with the walls and the Hearth is of Tyles and is as farr out into the Room at the Ends as before the fire, which is Generally Five foot in the Low'r rooms, and the piece over where the mantle-tree should be is made as ours with Joyner's work, and as I supose is fasten'd to iron roods inside. The House where the Vendue was, had Chimney Corners like ours and they and the hearths were laid with the finest tile that I ever see, and the staircases laid all with white tile, which is very clean, and so are the walls of the Kitchen, which had a brick floor."

SOME changes in the make up of *Carpentry and Building* this month will be noticed by our readers. So far as they affect the arrangement of our pages they are designed to bring the Editor into closer relationship with his readers, and to enable him to be more serviceable to them in every respect than in the past. The addition of plates affords us better facilities for illustrations than we have heretofore enjoyed, and we hope to employ them advantageously both in the way of showing practical work and in presenting artistic subjects appropriately. We hope in all respects to merit the continued approbation and co-operation of our readers.

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IT is not often that strikes in any of the trades have the good affect of introducing valuable improvements in the arts. There are exceptions to the rule, however. From the history of the use of iron in building construction it appears that the builders of Paris were first induced to employ rolled girders in the floors of their structures by reason of a strike of carpenters which occurred in that city some 40 years since. Captain Fowke, in writing on this subject, says: "The employment of rolled iron in girders and joists for floors, which is now very largely adopted in Paris, owes its origin to the circumstance of a very extensively organized strike of carpenters which took place in that city in the year 1846, before which time iron was, even to a greater extent than in this country [England], debarred by its price from entering into competition with wood in the construction of buildings and private dwellings. In order to extricate themselves from the position in which they were thus placed by such an event, and with a view of preventing its recurrence for the future, the Parisian architects and builders turned their attention to the substitution of iron for wood, both in the roofs and also in the flooring of buildings, and more particularly to the best means of reducing the weight and cost of the material.

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THE first difficulty to be encountered was to obtain a sufficient supply of iron of the sections most suitable for the purpose, the roofing of several of the theaters, which had been constructed by a combination of such sections as could be obtained in the market, riveted together, showing that the cost of labor consequent on such an arrangement must necessarily prevent its being generally employed. M. Vaux proposed and carried out the application of very thin flat bar or plate iron for floor joists, but these, being obviously ill-adapted to give the necessary amount of lateral stiffness and rigidity, were quickly superseded by a joist or girder whose section was in the form of a cross, proposed and made by M. Bleuze, and in which he sought to give lateral rigidity by a single flange at the neutral axis of the beam, which thus assumed in section the form of a Greek cross. This, although a failure so far as the section was concerned, was a great advance in one respect, viz., that it was an iron beam made in one piece, specially for the purpose for which it was intended, instead

of being merely made up of various shapes riveted together, as had been formerly the case, and as is to this day the case, in constructing wrought-iron girders in England.

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MUCH of the difficulty experienced by the French architects in perfecting this new construction was occasioned by the fact that, according to the custom which obtained at the time, the iron was transmitted from the manufacturer to the builder through the intervention of a dealer who was totally ignorant and careless both of the requirements of the latter or of the capabilities of the former to meet those requirements, and it was not until the manufacturer and builder were brought directly into communication that the best forms of iron were made, especially for the purposes of construction forming what are called in France *fers spéciaux*. The cross-shaped girder of M. Bleuze being, as might have been expected, weak in proportion to its weight, recourse was had to a girder which was first adopted in the construction of the St. Germain Railway Station, and which was a slight modification of the common I-rail, but which, being made a great deal too heavy, fell to the ground from its consequent high price, and it was not till the month of February, 1849) that the I-girder as now used was produced and first applied in Paris in the flooring of a house, No. 18 in the Boulevard des Fillies du Calvaire, for a bearing of 18 feet. The principle of the substitution of rolled iron for wood having been established, numerous modifications were proposed in the manner of its application and arrangement as to the ties, struts and connection with the remaining parts of the floor and ceiling."

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IN some directions it is considered beneath the dignity of young men to learn trades, and familiarity with a mechanical pursuit is regarded almost as a disgrace. This false pride upon the part of certain classes in the community, together with the action of trade societies, labor unions, &c., which have broken down the apprentice system and have shaped affairs so that it is practically impossible for the sons of mechanics to acquire the trades at which their fathers have earned an honest livelihood, is beginning to make the home supply of mechanics quite insufficient for the needs of the country. It is a well-known fact that at present our mechanics are recruited not from the rising generation, but by importation from European countries. Commenting on this, one of the New York daily papers says: "Unless industrial education is provided in the public schools, or technical training is accessible in institutions like the admirable New York Trade Schools, at First avenue and Sixty-seventh street, many boys who wish to learn trades will be unable to become proficient in any artisan occupation. In Germany and some other European countries every member of the royal family is required to master some trade, and certainly the privilege should be afforded to every youth who desires it in this great Republic. There are too many clerks and too few skilled laborers in this country, and not only must the door to the trades be kept wide open, but thorough technical training for all who wish it must be offered, especially in our great cities.

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ONE of the daily papers has been giving some attention to the number of dwelling houses in the City of New York. Some of the figures it presents are of general interest. When the last count was completed there were 101,735 buildings of all kinds standing within the city limits, and the present number is about 103,000. Of buildings used exclusively for dwelling purposes there are 48,780, and 30,500 of these are dwelling-houses, each occupied by only one family. The addition of 26,130 tenement-houses with stores on the first floors, and 2325 buildings which have rooms for families only in the top stories, brings the number of dwellings up to 77,235. If the population of New York was distributed evenly among the buildings used wholly or in part for dwelling purposes, each house would contain 18 persons, and there would be no complaints of overcrowding, but there are 21,580 tenement-houses which contain from two to four families on each floor, and such families usually consist of a man and wife and several children. About 3600 of those houses are more than four stories in hight, and 1800 of them are rear houses. There are also 16,800 flat houses or tenement-houses, which have an average of one family on each floor. A gradual thinning of population in the tenement-house districts is being brought about by the law which provides for the erection of fire-escapes on the front walls of houses which contain more than two families on each floor. Many property-owners are loth to disfigure the fronts of their tenement-houses with the iron balconies required by law, partly because of the expense attending the erection of such fixtures, and partly because they fear a reduction in rents.

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ONE of our San Francisco exchanges very frankly refers to the peculiarities of architecture in that city. In doing so, however it would have its readers understand that these peculiarities are altogether American, and by this means it makes the country at large, so to speak, responsible for the vagaries of design to be found in that city. It says: "There are more innovations in modern architecture in the United States than in England or any of the European countries, and the distinguishing feature in the American innovations is the striving after oddities, some of which have lately made themselves visible in San Francisco. While French and English architects the adhere closely to the old schools, the Americans follow only a vague suspicion of some school or style, and in most respects trust to their original inspirations. In this city some of the new residences would puzzle the most profound student of architecture to properly classify. The general result has been pleasing, however, from an artistic point of view, and if it shall be found equally so from practical living experience the innovations of the architects will be applauded and no questions asked as to school."

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SOME of the most eminent architects are of the opinion that the chief source of acoustical defects in a hall is the reflection of sound waves in such a way that they strike upon the ear of the hearer within a certain interval after the direct waves, and are recognized as an echo or resonance. It is ascertained, in regard to the limits within which this point exerts a disturbing influence, that a difference of 16½ to 23 feet not only causes no disturbance, but under some circumstances may produce favorable reenforcement of the direct by the reflected sound, and that with diminished intensity the difference may be somewhat greater, but under no circumstances should it exceed 33 feet. In regard to the acoustic conditions of churches it is asserted that the ceilings, which in theaters help the effect in the upper tiers, are too high for this, and may produce resonance or echo, and that it is therefore necessary to diffuse the sound reflected from them. Walls as well as ceilings require to be investigated in this respect.

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## THE PLATES.

In Plate I we present a perspective view with floor plans of a brick residence designed by Mr. J. R. Church, of Rochester, N. Y. The building in question is located at Sibley place, in that city, and was erected for Mr. Henry M. Hill.

Plate II shows a room fitted in oak, dating as far back as the fifteenth century or possibly the early part of the sixteenth century. It was originally located at Nuremburg, but some time since was brought over bodily to London, England. The room was the oak-paneled *salon* of Michael Wolgemuth, artist, who was born in 1439 and died in 1519, and lived, during some part of his life at least, in the house, 21 Burg Strasse, of which this room formed part, and it is exceedingly likely that the design is his, and the figures perhaps his own carving. Albert Dürer, the pupil of Wolgemuth, has probably been in that room often, and there is a tradition that Gustavus Adolphus found refuge in it once in a secret bedstead which forms parts of its accompaniments. This plate is of interest on account of showing the application of wood to ceiling and wall finish as practiced 300 years ago.

In Plate III we show a church building designed by Gould & Angell, of Providence, R. I., and now in progress of construction at Auburn, in that State. The building is of wood throughout, part of the gable-end, with the body of the tower, being shingled. The site on which the building stands is irregular in character, which adds much to to the appearance of the edifice. The main floor is devoted to the audience room, Sunday school and library, while the basement is provided with rooms for social purposes.

In Plate IV we present some studies in what English designers designate by the term "Over-Doors." In old cabinet-work the over-door was treated distinctively as an architectural feature—in fact, as a portion of the door itself, which by right it should be. In later work it has been frequently omitted by the architect, and accordingly there arises in some instances a demand for something to supply the deficiency. This naturally falls to the cabinet-maker or the carpenter. The demand is greater at the present time on account of the fashion of fitting up rooms in imitation of old styles of architecture. The designs presented are by Mr. R. Brook, who has had much experience in work of this kind. When the contrast between the wood used in the cabinet-work, of which the over-door would be a sample, and that used in the door is not too violent there is no great objection to this modern innovation, but it should not be forgotten that the over-door in reality belongs to the door and its frame-work, and accordingly its use should be restricted to supplying omissions only.

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A late issue of the London *World* contains the following interesting description of one of the handsomest and most elaborate mansions in Great Britain: "The rebuilding of Mountstuart, Lord Bute's place, near Rothesay, has now been completed, and it is one of the most magnificent mansions in Great Britain. The house covers an acre, and is in the mediæval Gothic style of the thirteenth century. The walls, turrets and balconies are built of stone brought from a quarry in Kirkcudbrightshire. In the center is an immense tower 120 feet high, with a wide balcony all around the top. The great hall is constructed entirely of alabaster and the rarest marbles, with columns and a gallery, and the grand staircase is also of marble brought from Sicily and Carrara. The drawing-rooms are paneled with walnut and beautifully decorated, and so are the dining-rooms, the largest of which accommodates 80 guests. The ceilings and chimney-pieces of all these rooms are most artistic, and so also are the windows, the work of which is extremely elaborate. There are three immense libraries and a billiard-room, all with carved stone fireplaces of antique design.

In one wing are Turkish and swimming baths, and there are large conservatories, and a private chapel is now building. The whole house is heated by hot-water pipes and lighted throughout by incandescent lamps. The furniture is now being placed, and in the gallery will be hung the famous Luton Hoo collection of pictures, which have recently been exhibited at Bethnal Green, Glasgow, and Manchester. The building, decorating and furnishing of this place have cost nearly a million. Lord and Lady Bute, who have been staying for some time at Chiswick, will now make Mountstuart their principal residence."

## A Group of Statuary in Sheet Metal.

The accompanying engraving represents a group of statuary furnished some time since by Bakewell & Mullins, of Salem, Ohio, for the Marshalltown Courthouse, Iowa, of which J. C. Cochran of Chicago, was the architect. The group is an imposing one, and in outline, draping and other features represents better work of its class, perhaps, than has ever before been done. The central figure, which is 12 feet high, represents Justice, while the figures at the right and the left typify Commerce and Agriculture respectively. The horn of plenty, the plow, the bale of cotton, the case of goods and the sheaf of grain all have their significance, and combine to render the work effective in its symbolical sense. The group stands on a pediment of the building, the pedestal being some 24 feet in length.

GROUP OF STATUARY IN SHEET METAL, EXECUTED BY BAKEWELL & MULLINS, SALEM, OHIO.

Comparative tests of the granites of New England and Minnesota, instituted by Professor Winchell, with a view to determining their crushing strength, exhibit some surprising differences. The pieces employed for this purpose were 2-inch cubes unpolished, and crushed between wooden cushions the average strength of 20 specimens of Minnesota granite was found to be 93,272 pounds, or 23,318 pounds per square inch; crushed between steel plates the average strength was 104,800 pounds, or 26,200 pounds to the square inch of surface. The average obtained for the same number of specimens of New England granite was 59,789 pounds, or 14,756 pounds per square inch. The age of Minnesota granites is archæn; that of New England granites is not definitely known.

## What a Single Number of "Carpentry and Building" Contains.

Some of our readers perhaps who are in the habit of going carefully through every number of *Carpentry and Building* as it reaches them will be somewhat astonished at the title which appears above. They will perhaps read what follows in an endeavor to find out just what we mean by it and what we are going to say on such a subject. An old story is said to possess comparatively little interest to those who happen to hear it, and in some respects any journal which is a constant visitor becomes an old story, and portions of the paper which are supposed to be of less interest than others are neglected in favor of those that are the more important. If we were to attempt to analyze the motives of those who subscribe to this paper we should no doubt be able to show that they are many in kind, and spring from different sources. Leaving all this aside, we propose at this time to call attention, as briefly as possible, to what a single number of the paper contains, thereby reminding our readers of its wide scope and assisting them somewhat to pick out from month to month those portions which are to them of the greatest importance. Perhaps our readers are better acquainted with what may be termed the editorial part of the paper than with any other, and we might safely pass by any enumeration of the contents of a number in this respect. However, we propose to be as thorough as possible in the list we shall present, and therefore we shall include everything that we find within its covers. We will take the December issue as the illustration in point. Other numbers have been quite as good, and we hope in the future to present numbers that are better. It will, however, serve the purpose at this time as well as any.

### READING MATTER.

The first article in the editorial part of the paper gave attention to the subject of "Remodeling Old Buildings," and described briefly how such work is occasionally performed in New York, with an illustration of a building recently renovated. Following this was a brief *résumé* of the history of "Brick and Tile." A "Cheap Frame House" was then presented, illustrated by no less than 16 engravings, including perspective view, plans and details to scale. In the form of "Notes and Comments" some particulars were given with reference to the success of the manual training schools in Philadelphia; the Novelties Exhibition was referred to; the proceedings of the Nineteenth Annual Convention of the American Institute of Architects were epitomized, and comments on the New York Lien law were made. "Wooden Water-Pipes" were described, with four illustrations. A novel form of "Drawing Compasses" was illustrated, an "English Strongroom" was described, and an "Anglo-Japanese Mantel-Piece" was illustrated. A brief paragraph referred to the venerable Thomas U. Walter, of the architectural profession in Philadelphia. "The Plumbing and Water Supply of the New York Cotton Exchange" was elaborately illustrated and described, and "Waste Material in Building Construction" was briefly considered in view of recent discoveries. In the Correspondence department "Miters and Bevels" were discussed by H. A. P., who employed two diagrams. "Fire-proof Shingles" were inquired about by W. C. V., while Charles Rohlfs illustrated and described a "Beam Compass" which he is employing. "Building Association Problems" were considered by R. D. C., following which were some directions for "Imitating Rosewood." The longest article in this department of the paper was entitled "Splayed Jambs," in which the Editor presented a very complete demonstration of one method by which the shape of a circular window head to be placed in a curved wall may be obtained. P. W. D. answered a question published in a former number relating to "Perry's Stairbuilding," while E. & R. were answered with reference to "Painting Tin Roofs." Information with reference to "Carpenter's Tool Baskets" was furnished by G. O. G., while J. K. C. asked about means for "Preventing Frost on Show-Windows." The advisability of using "Tarred Felt Under Tin Roofs" was questioned by R., while J. D. W. delivered an opinion on "Backing Rafters." H. W. E. inquired about "Strength of Timber," A. L. about the construction of a "Limekiln" and W. G. about a "Sheep Barn." The "Novelties" department of the number under consideration was particularly full and interesting. The "Forstner Auger Bit," which does many curious things, was shown in an improved form. A "Combination Vise and Lathe," useful to amateurs, was likewise illustrated and described. Next followed a "Foot Lathe" embodying special features of excellence,

after which a means of "Hanging Doors" without hinges was illustrated. A "Window Tightener," without engravings, was described, and a "New Shingling Bracket" was illustrated. "Drinking Fountains" with a provision for cooling the water were presented, and a new form of "Chimney Cap" was illustrated. A "Blind-Slat Holder" intended to overcome the rattling of blind slats was illustrated, and a second cut was given showing its application. A new form of "Plasterer's Hawk" was described, and a "New Locking Hinge" claimed to possess important and desirable features was illustrated. "A Fire-Proof Composition Plate" intended to play an important part in building construction, and to a certain extent competing with common plaster-work, was illustrated, and the application of a current of warm air for preventing the formation of frost on show-windows was presented. A "New Band Saw Mill" intended for use in manufacturing lumber from the log was shown by a large engraving, while an improvement in saws calculated to overcome the buckle sometimes encountered and to make the tool lighter was likewise presented. A "Combined Sheeting and Lath" by which buildings are greatly strengthened and by which ordinary lathing is done away with was shown. A "Reversible-Spring Window-Bolt," being an improvement on the ordinary tubular bolts largely in use, closed this department. Under the head of "New Publications," five volumes, all of interest in the mechanical trades, and some of them particularly valuable to our readers, were briefly reviewed, In our department of "Trade Notes" brief mention was made of a number of firms and to several lines of goods in which our readers are supposed to be particularly interested.

ADVERTISING.

As long as is the foregoing account of the editorial portion of the paper, it will perhaps require still more space to adequately reflect the contents of the advertising pages of the same number. Brevity is said to be the soul of wit, and the Editor appreciates brief communications and short articles as much as any one, but he never has yet learned how to manage his part of the paper with the same degree of condensation as obtains in the advertising portion, where every word occupies space that must be paid for. Some one, in talking about the tendency of our language as influenced by modern improvements and means of communication, has made use of the term "telegraphic English." An appropriate expression to indicate another form of condensed expression would be "advertising English." A very considerable amount of advertising English copiously illustrated is in every number of this journal.

HAND TOOLS.

In enumerating the large number of items contained in the advertising part of the paper we can present little more than an index, but if in so doing we influence our readers to turn to the pages themselves for information we shall have served their interests. Perhaps the most important line of goods to the largest number of our readers is hand tools. In this department a very considerable number of articles were mentioned. The Stanley Rule and Level Co. called attention to their Duplex Rebate Plane and Filletster. The Jennings & Griffen Mfg. Co. directed attention to their mechanics' tools and special boring implements, with illustrations of two forms of ship augurs. R. H. Brown & Co. presented Clark's Screw-Drivers and Expansive Bits. The Syracuse Twist Drill Co. called attention to twist drill bits for carpenters' use. O. A. Bassett described the advantages of his tool for spacing and marking clapboards. Nichols & Bellamy illustrated Hyde's Improved Miter-Box. The Millers Falls Co. presented the Star Hack Saw, and W. P. Walters & Sons requested the trade to send postage for an illustrated catalogue of the most approved tools. Charles Morrill directed attention to his Perfect Saw Sets, and Aborn & Haskell showed Elkins' Saw Clamp and Guide. Richardson Brothers displayed their new hand-saw, and C. E. Jennings & Co. called attention to their Extension Lip Auger Bit. J. E. Stevens & Co. offered to send to any applicant an illustrated catalogue of their countersinks, while the Coates Clipper Mfg. Co. advised all wood-workers to ask their hardware dealers for Kidder's Awl and Tool Holder. Tallman & McFadden directed attention to their stock of tools for mechanics in general, and T. C. Massey called attention to his patent vises. Samuel C. Tatum & Co. presented a new form of cabinet scraper, and John W. Harmon illustrated a builders' level. Witherbee, Rugg & Richardson showed Allen's Floor Clamp. The Bridgeport Gun Implement Co. showed the Forstner Auger Bit. Otis A. Smith presented Fale's Variable Bench Plane. The Connecticut Valley Mfg. Co. directed attention to the Lewis Patent Bits. M. A. Robinson presented the merits of Holt's Gimlet Bits. T. A. Barnes advised the trade to ask dealers for the Ellrich Socket and Ratchet Screw-Drivers. E. Roth & Bro. showed Roth's Saw-Filer, and the Harvey W. Peace Co. presented Peace's Perfection Saws. Charles A. Strelinger & Co. showed a new molding tool, and also illustrated a tool basket, an English invention, but serviceable to Yankee mechanics. Files for sharpening their saws were offered to carpenters by the Black Diamond File Works, and a general line of tools was presented by Louis Ernst & Son.

HAND AND FOOT POWER MACHINERY.

Hand and foot power machinery is attracting attention at the present time. Charles E. Little, a dealer in tools of this kind, called attention to his general line of goods. J. M. Marston & Co. presented their hand and foot power circular saw; the Seneca Falls Mfg. Co. illustrated a double-treadle scroll-saw and the Naragansett Machine Co. presented a sectional view through their foot-power circular saw. W. F. & John Barnes illustrated their builders' scroll-saw, while the Barnes Tool Co. presented their self-feeding hand-sawing machine.

WOOD-WORKING MACHINERY.

A large assortment of regular wood-working machines was presented. Goodell & Waters were in the front, so far as space occupied is concerned, and presented 12 designs illustrating useful devices. Seymour & Whitlock directed attention to their iron top and iron frame saw tables, while Greenlee Bros. & Co. presented an engraving of their self-feeding saw table. E. & F. Gleason presented their card, with a single engraving, as manufacturers of wood-working machinery. C. B. Rogers & Co. illustrated a band-saw and planer. Rowley & Hermance showed two of their machines, with prices on several sizes and kinds. Witherbee, Rugg & Richardson enumerated some of the kinds of wood-working machines which they manufacture, and the S. A. Woods Machine Co. called special attention to the eight gold medals which they received at the New Orleans Exhibition. Joseph O. Coladay & Bro. called attention to their patent wood-working machinery, while S. K. Lovewell & Co. referred to their molding machines and car-boring machines. F. H. Clement illustrated a band-saw, while London, Berry & Orton called attention to their band-saw blades. The Rawlston Machine Co. mentioned gauge lathes and a new planer and matcher just built from new designs. Alvin Streator presented his card and invited the trade to write for prices. Samuel J. Shimer illustrated and described the Shimer Matcher Heads. P. Pryibil presented specimens of twistwork produced in lathes of his manufacture. Cabinet saws and routing machines were mentioned by John Royle & Sons. A general line of wood-working machinery was described by Swank & Co. The Egan Co. directed attention to the wood-working machinery of their manufacture for planing mills, furniture factories, &c.

ROOFING.

What roof shall we use, and how shall our buildings be covered? are questions that interest architects and builders generally. The H. W. Johns Mfg. Co. referred to their perfected form of portable roofing, which has had long use upon buildings of different kinds. The Cambridge Roofing Co. directed attention to Crowl's Patent Iron Roofing, and the Cincinnati Roofing Co. illustrated their Interlocked-Joint Ready-Made Roofing. The Penn Roofing Co. called attention to their roofing felt and other specialties, while T. C. Snyder & Co. directed the trade to the iron roofing of special quality which they produce. The Cincinnati Corrugating Co. mentioned iron roofing, siding, ceiling and other specialties. The Warren Ehret Roofing Co. presented "Complete" roofing, waterproof sheeting and roofing materials in general. Vandevoort & Tucker explained how leaky roofs may be repaired. The Warren Chemical and Mfg. Co. called attention to Warren's Natural Asphalt Roofing, with a formidable list of references. M. Ehret, Jr., & Co., who are the largest coal-tar distillers in America, presented their prepared roofing, with a list of other goods carried in stock. The Garry Iron Roofing Co. called attention to iron roofing and iron-ore paint and cement, while the Mosely Iron Bridge and Roof Co. directed attention to corrugated roofing and other goods of their manufacture.

METALLIC SHINGLES.

Sheet-metal shingles are a prominent kind of roofing at the present time, and these were represented by the National Sheet Metal Roofing Co., who described at some length the merits of the Walter's Shingle; the Garry Iron Roofing Co., who make a painted iron shingle, and E. Van Noorden & Co., who are manufacturing the Montross Metallic Shingle.

TIN PLATES.

Where tin roofs are employed it is important that good material be secured. Merchant & Co. called attention to their guaranteed plates and brand-stamped plates; Gummey, Spering, Ingram & Co. referred to their leading brands, with incidental mention of metallic shingles. N. & G. Taylor Co. invited the trade at large to drop a a postal-card request for their circular, "Do You Get What You Specify?"

HARDWARE.

Builders' hardware is an important item in the construction of every house. Staple goods are so much in demand as to be found everywhere, and accordingly are but little advertised. Specialties, therefore, are the leading items in the cards presented month by month to our readers. In the number under consideration Butler & Constant illustrated and described the Ives Sash Lock. The Miller Lock Co. called attention to a special line of goods indicated by their name, and the Van Wagoner & Williams Co. presented a price list, with illustration, of their spring hinges. The Stanley Works directed attention to their general line of goods, including butts, hinges and door bolts. The Chicago Spring Butt Co. directed attention to three kinds of spring hinges of their manufacture, while John Campbell called attention to hardware specialties, including wood hitching-posts, wood harness-pins, &c. The Kohn Gravity Lock Co. presented their Gravity Blind Catch, while J. B. Shannon & Sons invited the trade to send for their new illustrated catalogue of builders' hardware. A. G. Newman directed attention to fine bronze hardware and other specialties, and the Victor Door Knob Co. showed the Victor Door Knob. The Nashua Lock Co. presented their card, with an illustration of one style of door knob of their manufacture. The Dibble Mfg. Co. solicited inquiries with reference to Hemicite door trimmings. John W. Harmon placed before the trade his double-clasp blind-slat holder, and M. E. O'Connor called attention to builders' hardware and to several specialties which he controls.

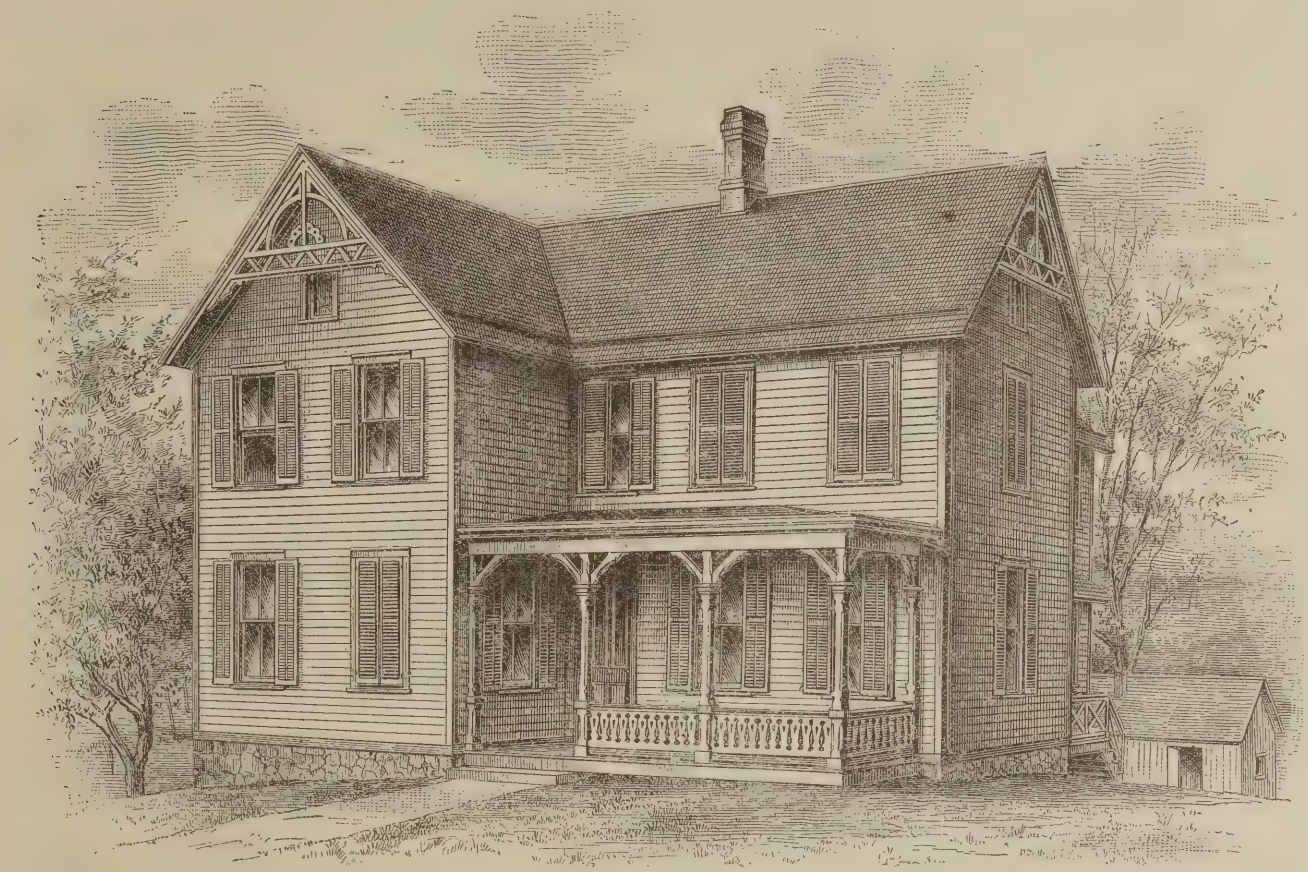
HEATING.

A modern adaptation of the old adage, "In peace prepare for war," would be, "In summer time make ready for heating your houses for the winter." It is probably true that more heating apparatus is sold and put up in position in the summer season than in the winter time, but our advertisers, in pursuing the plan of constantly keeping their name before the public, are as conspicuous with their cards in our December number as they are in our summer issues. Perhaps the necessity, however, of a good apparatus to take the place of faulty appliances which often becomes apparent in cold weather makes their offers better appreciated at this

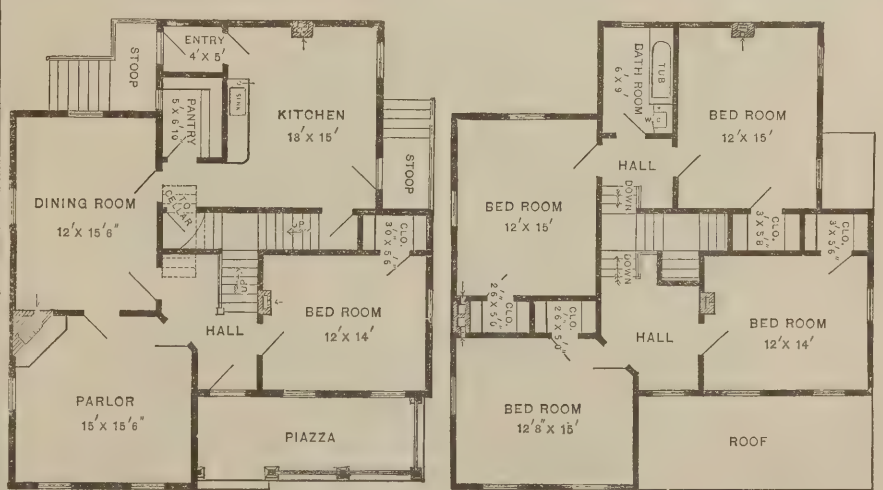
(*Concluded on page* 10.)

## Design for a Farmhouse.

Some months since Mr. F. J. Grodavent of Leavenworth, Kan., whom many of our readers will remember as an occasional contributor to our columns, sent us the floor plans for a farmhouse which had been erected under his supervision a short time before. The plans in question were published among others contributed in response to requests from correspondents. In our November issue we published a perspective view of a design drawn by one of our correspondents living in this State, showing one idea of how the house might be designed. When Mr. Grodavent sent us the floor plans his request was that we refer them to our readers with the suggestion that sketches of the design be sent us by our correspondents. At the same time he promised at an early date to give us some particulars with reference to his own design. Mr. Grodavent has made good this promise by forwarding us photographs of the completed building. From these we have had the accompanying engraving prepared, and now lay it before our readers for their inspection, bringing forward the floor plans, so that all the features may be examined at once. In his letter to us Mr. Grodavent says it will be noticed that the house is quite plain. Extra ornaments, however, such as gutter brackets, cresting, &c., could be added at a small additional cost. The building as it stands has cost about $2500 to build. Mr. Grodavent adds that the perspective view of a house to those plans published in the November number shows, in his estimation, a very neat design, and one well suited to the conditions named. Studies in house designing of this kind, where elevations or perspective views to the same set of plans are prepared by different designers, have always proved of special interest and value to our readers. In this case they afford the opportunity of comparing the work of men situated in parts of the country remote from each other.



*Farmhouse Designed by F. J. Grodavent, Leavenworth, Kan., Engraved from a Photograph.*




First Floor. Second Floor.

*Floor Plans of Farmhouse.—Scale, $\frac{1}{16}$ Inch to the Foot.*

## The Heads of Wood Screws.

It may be questioned whether the present proportion of bevel or angle to the heads of wood screws is the best, and the proportion of diameter between head and shank is the best. A wood screw has a head that is twice the diameter of the shank, and its under side bevel presents a face that is two-thirds the diameter of the shank or the original wire; thus: Diameter of shank, $\frac{3}{16}$ inch; head diameter, $\frac{6}{16}$ inch; bevel of head, $\frac{2}{16}$ inch. Thus the head is very flat or broad in comparison with the shank or size of the original wire from which the shank is formed.

Nails, which are driven into the wood and hold only by longitudinal friction, have very small heads—in finishing nails, hardly enough to redeem the nail's form from that of an elongated wedge. Screws hold by transverse projections—the thread—and certainly do not need any larger proportional head than do nails. All the heads of screws are "upset" in a heading machine; in some

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A popular supposition is that a building with a metal roof, or one that employs metal freely in its construction, is more likely to be struck by lightning than a building composed wholly of non-conducting materials, provided there is no means of electric communication between the metal and the earth. In a recent address before the French Academy of Sciences, Mr. Calladon declared that there was no truth in this idea. A house in Neufchatel, Switzerland, had been struck by lightning and burned, and somebody suggested that a lot of old iron stored in the attic had attracted the electric fluid. Mr. Calladon said that the iron had had nothing to do with attracting the lightning, but had probably been a cause of the burning of the building after it had been struck. The explanation of that is that a combustible substance placed between two conducting surfaces (in this case the humid atmosphere and the pile of iron) is likely to take fire when an electric current is passed through it from one conducting surface to the other. The lightning having struck the house, concluded the scientist, it found its way to the metal within, and ignited whatever combustible material it passed.

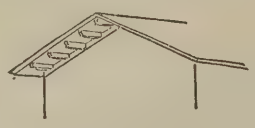
instances, as of short screws, the upset head absorbing one-third of the length of wire cut for the screw. This great spreading, of course, weakens the tenacity of the metal and tends to "broom" it out. To this weakness, inherent in the unfinished blank, is to be added the slotting of the head for the bit or blade of the screw-driver. This cut, always of a generous width, extends in depth almost to the bottom of the beveled head (more than half-way, making the head weaker as it goes downward, because of the decreasing diameter of the head), in effect nearly splitting the head in two. There are faults in the present construction of wood screws that are apparent on consideration. Suppose that the proportions of the screw were changed, so that the diameter of the head should be less and its bevel more. For instance, take the foregoing size of screw: Shank, $\frac{3}{16}$ inch; diameter of head, $\frac{1}{4}$ inch; bevel of head, $\frac{1}{4}$ inch. This would make a head smaller in extreme diameter, but twice as deep, as the present style, while the head would be stronger, because it was less upset from the original wire size, but the screw-driver cut need not be any deeper. The long slant of the bevel of the head would obviate the necessity of a countersink except in very hard woods.

## Various Types of Roofs.

An architectural writer has declared that what the hat or bonnet is to the head the roof is to the house, changing it from grave to gay, from gentle to savage, from dignity to frivolity, from grandeur to insignificance, from the sublime to the ridiculous, at will. The only thing lacking to complete the comparison is the fact that houses seldom change their roofs. When once provided with a covering the shape is not often changed, while with men and women fashion dictates that hats and bonnets shall change as often as the seasons change. A house may be as square as a brick, as devoid of character as a soap-box, but the roof has power to crown it with innumerable graces and uncounted deformities. All this is possible without any departure from familiar and approved patterns or the introduction of remote barbaric styles. Those who hunger and thirst after variety need not remain unfilled while the form of the roof is left for their direction. The accompanying engravings show a few of the origiaal types. When these are crossed, mixed, modified or combined in one unfortunate building or group of buildings, the results are not only beyond all computation, but are not unfrequently fearful and wonderful to behold. We recently illustrated "crazy" and sham roofs. The roofs here shown are honest roofs, but the crazy and sham varieties are easily produced by the method of crossing and modifying above suggested. Mr. Gardner, to whom we are indebted for some of the above ideas, concludes that in the millennium roofs will be simple and unaffected, modestly but firmly resolved that the house and they that dwell therein shall be protected from the elements. With this idea before us, considering the kind of roofs that are largely in vogue nowadays, we are forced to believe that the millenium is yet a long way off.

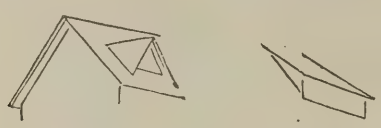
*Gable Roof with Pediment.*

*Semicircular Arch Roof.*



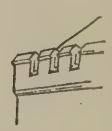
*Typical Swiss Roof.*

*Curb or Gambrel Roof.*

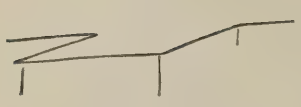


*Suggestions of Dormer Windows in Roofs.*

*Gable Roof with Horizontal Cornice Returns.*



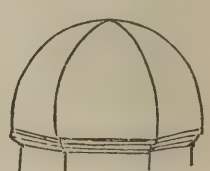
*Fragment from an Ancient Castle.*



*The Pent or Shed Roof.*

*Double Pitch or Gable Roof.*

*Hip or Pyramidal Roof.*



*Arched Turret.*

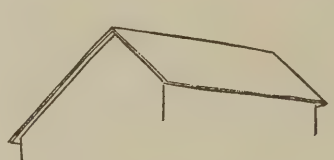
*French or Mansard Roof.*

*Pyramidal Turret.*

*Combined Hip and Gable Roof.*

*Hip Roof with Broken Rafters.*

*Ornamented Gable in the English Style.*

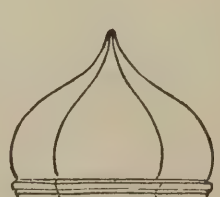


*Gable and Shed Roof Combined.*

*A Bell Shaped Turret.*

*Gable with Ornamented Verge-Boards.*

*Queen Anne (or Mongrel?)*



*Moresque Turret.*

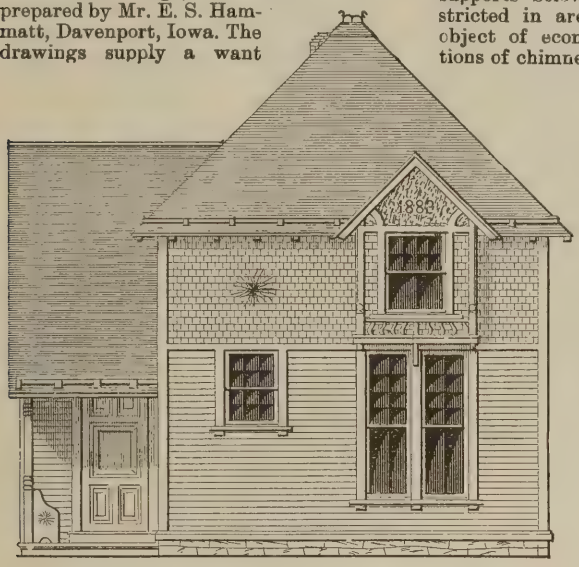
SKETCHES ILLUSTRATING VARIOUS TYPES OF ROOFS.

In his first annual report to the Secretary of the Interior, upon the operations of the Labor Bureau since its establishment, Commissioner Carroll D. Wright begins with a statement of the organization of the bureau

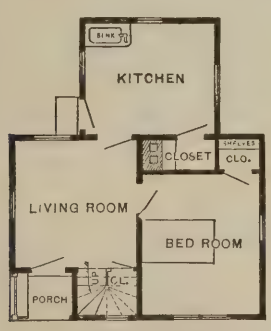
and a review of the line of policy outlined for the conduct of its investigations. The principal features of that policy were a refusal to recognize parties—that the bureau should be disconnected with politics and from dependence on organizations, whether of workingmen or of employers, and from the support of economic theories, individual views or class interest. The Commissioner believes that this policy generally has been approved throughout the country.

## Four-Room Cottage.

The elevation and plans upon this page and the details upon the pages following, showing the design and arrangement of a four-room cottage, were prepared by Mr. E. S. Hammatt, Davenport, Iowa. The drawings supply a want that is often experienced by builders, namely, a tasteful design for a small house, and one which, while presenting an attractive appearance, is still reasonable in cost The author estimates the building to be worth in the neighborhood of $800. One of the special advantages of the design and arrangement to which he directs attention in submitting these plans is that the building is so arranged that its owner can at any time, at small additional cost, add materially to its convenience. The unfinished room in the second story, for example, could be made into a commodious bedroom, thus making the house one of five rooms instead of four, as we have designated it. Should this unfinished room be employed as suggested, a door could be cut from it into the atic space over the kitchen, thus providing either a closet or a storeroom, as might be preferred. Still other modifications will suggest themselves to the practical builder. A cellar, not provided for in the plans, could be supplied under the entire house, or if desired it might only be under a portion. In the latter case it could be placed under that part marked "bedroom." If a cellar is provided the entrance could be arranged through what is at present marked "closet," opening from the kitchen.



*Four-Room Cottage.—Front Elevation.—Scale, ⅛ Inch to the Foot.*



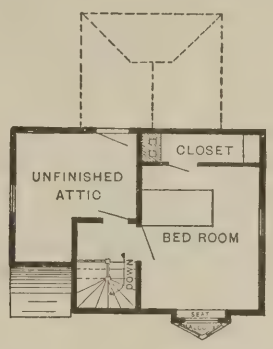

*First Floor.—Scale, $\frac{1}{16}$ Inch to the Foot.*

## Chimneys.

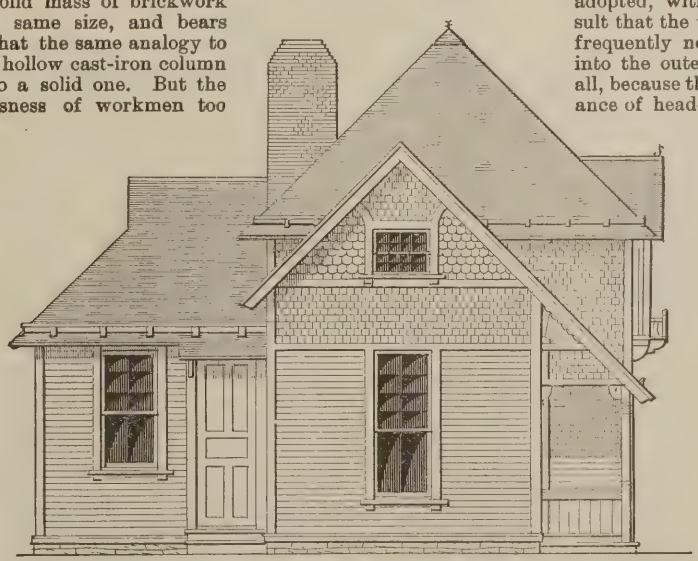
One of our engineering exchanges asserts that, in view of the fact that the sky-line of town architecture is so conspicuously marked by chimney stacks, it is to be wondered at that more artistic taste is not exercised in designing them. The care and judgment bestowed by builders in all ages upon towers, spires, cupolas and other parts of a building whose outlines are visible from so many points of view would have led us to expect more satisfactory results in relation to chimney stacks. Their unornamental appearance has sometimes resulted from their extremely light and even meager construction, adopted less for the purpose of saving material than to avoid piling unnecessary weights upon the supports below, which are often much restricted in area and projection, with the object of economizing space. The proportions of chimney stacks in London are very properly regulated by legislation. Under the Metropolitan Buildings act of 1855 no chimney stack is allowed to be carried to a hight exceeding six times its least width, measured from its highest point of junction with the roof, unless it is bonded to another stack or shaft which would support it after the manner of a buttress, or unless it is, in the words of the act, "otherwise rendered secure." These words at the end of the clause leave some discretionary power to the district surveyor, who may determine to what extent gable walls, towers, turrets or other erections built against chimney stacks can be regarded as adequate supports. But the stability of a stack is dependent no less upon its internal construction than upon the proportion of its width to its hight, and we generally find that the best methods of construction suggest the most appropriate methods of ornamentation.

The practice of carrying up the walls of a stack in half-brick work is exceedingly common, and when proper bonding and good Portland cement are employed such construction is perfectly safe and satisfactory. A well-built stack of flues is nearly as stable as a solid mass of brickwork of the same size, and bears somewhat the same analogy to it as a hollow cast-iron column does to a solid one. But the carelessness of workmen too often escapes the master's eye, or that of the foreman, with perilous results in the half brick walls and withes of chimney stacks. The walls of a stack should be of whole-brick thickness, at least up to the level at which it emerges above the roof The rule laid down in the Buildings act, that no wood plugs shall be driven nearer than 6 inches to the inside of a flue, clearly assumes that such a flue is protected by a 9-inch wall, and great danger from fire often results through overlooking such points as this. It is, indeed, better to carry up whole-brick walls to the entire hight of a stack when the expense involved is not deemed too great. A thick wall keeps the flues warm, and so prevents the smoke from hanging back, while a thin wall is liable to be penetrated by damp, which causes the pargeting to crack and scale off, leaving the flue more than ever exposed to the influence of cold air. The best pargeting is formed with one part of lime and three of cow-dung, which is much to be preferred to a Portland cement rendering inside a flue. When stacks are built in English bond there are practical difficulties to be encountered in properly bonding the withes into the walls. When the outside wall is of whole-brick thickness the cross withes of 9-inch flues can be bonded in between the stretchers, and half-bats can be inserted to make up the width in 13½-inch flues. When we come to a course of headers, however, we must either be content to let the withes butt against them, or we must bond them into a depth of 2¼ inches against three-quarter bats, filling in with half-closers, unless we would miter our bricks, which is rather a troublesome operation. It will be observed that in bonding our withes between the stretchers we are really adopting Flemish bond on the inside of our stack, while preserving the appearance of English bond outside. There is no objection to this, but when we build a stack with half-brick work the difficulty in bonding arises at once. No one likes to use half-bat headers in such work, and a stretching bond is therefore adopted, with the result that the withes are frequently not bonded into the outer shell at all, because the appearance of headers would destroy the uniformity of the work. To bond them in they must either be cut to miter, or must be let in to a depth of 2¼ inches, against a queen-closer and a half-closer, or a brick with a half-closer notched out of it—which probably breaks during that operation.

When Flemish bond is used for chimney stacks all difficulties about bonding the withes are at an end, and the sound con-

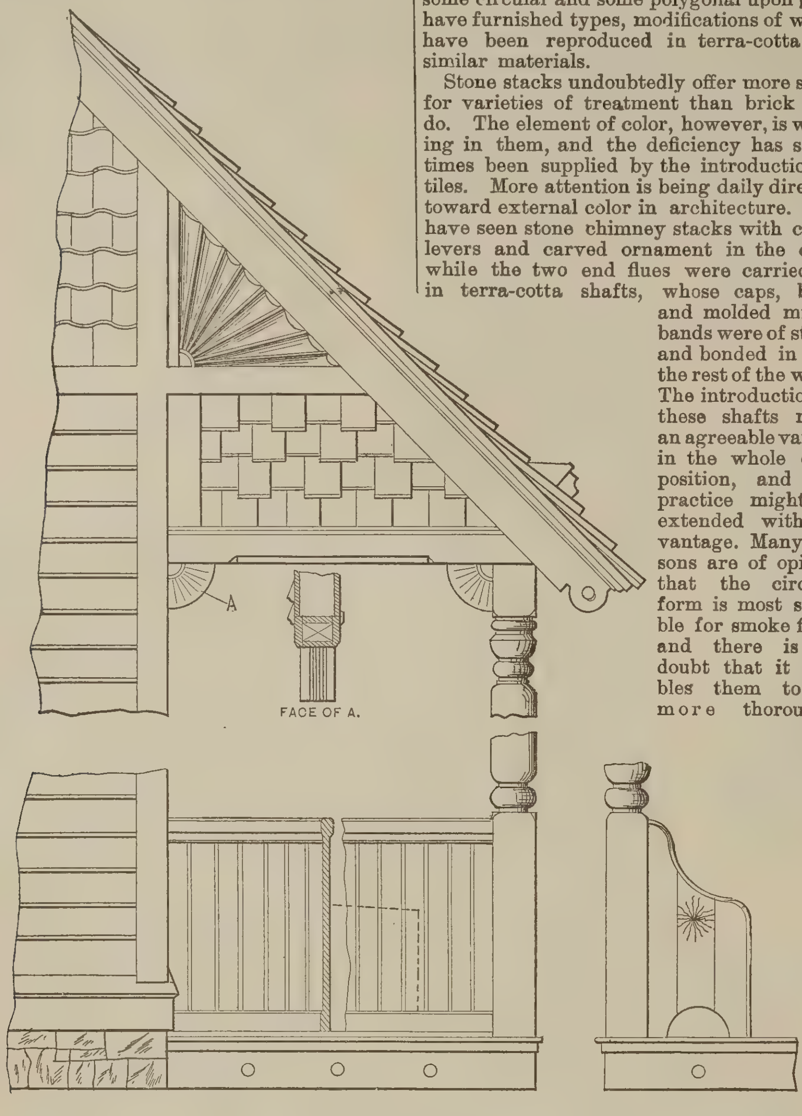



*Second Floor.—Scale, $\frac{1}{16}$ Inch to the Foot.*



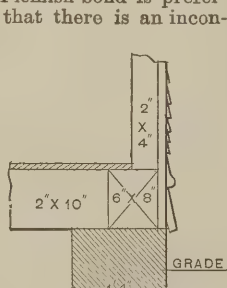
*Side Elevation.—Scale, ⅛ Inch to the Foot.*

struction of a stack arises naturally out of the arrangement of the bricks in it. Flemish bond has always been admired for its appearance above English bond. No one,




*Four-Room Cottage.—Details of Piazza.—Scale, ¾ Inch to the Foot.*

however, doubts that the latter is superior for the ordinary purposes of walling, and that it is only in such matters as the build ing of flues that the Flemish bond is preferable. If it be urged that there is an incongruity of appearance in using different bonds respectively for the stacks and walls of a building, this can be corrected by a device which the common-sense brick architecture of the present day has rendered fashionable, and which enables us to construct our stacks in a sound and durable manner, while decoratively emphasizing their meaning. This consists in forming a 2¼-inch projection opposite each withe, thus forming vertical lines of shadow, which carry up the eye,

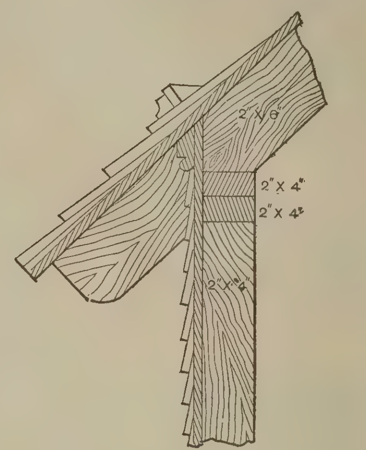



*Section Through Water Table.—⅜ Inch Scale.*

like the projections upon the faces of some of the Venetian campaniles. Sometimes these veitical projections can be terminated above with arcading, or with terra-cotta cantilevers. They might be formed with molded bricks with some ncvelty of effect. We are not aware that this has yet been attempted. Some ornamental brick chimneys that have been much admired remain to us from the late Tudor and Elizabethan periods. Some of those at Hampton Court Palace, in which there are several clustered shafts, some circular and some polygonal upon plan, have furnished types, modifications of which have been reproduced in terra-cotta and similar materials.

Stone stacks undoubtedly offer more scope for varieties of treatment than brick ones do. The element of color, however, is wanting in them, and the deficiency has sometimes been supplied by the introduction of tiles. More attention is being daily directed toward external color in architecture. We have seen stone chimney stacks with cantilevers and carved ornament in the caps, while the two end flues were carried up in terra-cotta shafts, whose caps, bases and molded middle bands were of stone, and bonded in with the rest of the work. The introduction of these shafts made an agreeable variety in the whole composition, and the practice might be extended with advantage. Many persons are of opinion that the circular form is most suitable for smoke flues, and there is no doubt that it enables them to be more thoroughly swept than when there are corners where soot can lodge. Flues in concrete buildings are generally formed with cores of cylindrical form, but slightly tapered toward the lower end, so that they can easily be drawn upward as the concrete sets around them. Glazed-earthenware pipes have sometimes been built in as flues. They have their advantages, but it has been complained that in them the soot obtains a lodgment in flakes, which are constantly slipping down. It is, of course, undesirable that soot should be disturbed. except with the brush. The popular method of sweeping frequently injures the pargeting of flues, and many persons are of opinion that the plan adopted in Germany would be preferable. There every flue is carried down to a cellar in the basement, so that the chimney stacks are of the entire hight of the house. When a flue is to be swept, the register in the room is closed, and the sweep's brush is let down with a rope into the basement cellar, where the soot accumulates, and is cleared away. The length of flue from the fireplace is afterward swept with a short brush. Much dirt is thus saved in the rooms, and there is no doubt that if a good supply of cold air is admitted in the cellar, where the flues terminate, it will cause a strong up-current, which will greatly facilitate the passage of the smoke, which deposits the least soot where it passes upward most rapidly.

It is often the practice to insert gratings in the upper portions of chimney stacks where there are ventilation flues for the extraction of foul air. Sometimes these gratings are placed at both back and front, so that strong currents of fresh air can pass through them. When this is done it is usual to omit the openings provided at the top for smoke flues. The cold cross current, however, rather tends to check the egress of foul air, and, by chilling and condensing it, to drive it down. If the gratings are pro-

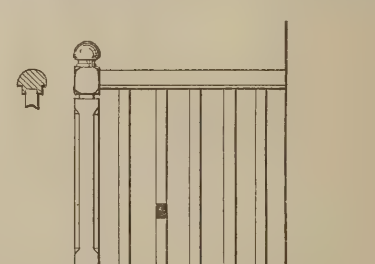



*Section Through Cornice.—¾ Inch Scale.*

vided with louvres inclining upward and inward, and an opening were provided at the top, it is probablo that the egress of the foul air would be encouraged by this means. Anything unfavorable to the free egress of smoke must be equally so to that of foul air, and if the means here suggested for increasing the up-current in smoke and ventilation flues should prove efficacious we might hope that a step would be made toward the æsthetic improvement of chimney stacks in dispensing with the necessity for those ugly cowls which too often disfigure them.

## Schools of Carpentry.

We have published in the past more or less working schemes of practical education for carpenters and builders. We have expressed regret that there are no trade schools distinctively devoted to this important branch of business in this country. England has several institutions of this character, while in France and Germany and in other parts of Europe building schools also thrive. The best our own country affords is in the form of partial courses in a few institutions. As furnishing our readers some indication of the thoroughness of the course in some of the English schools, we append the questions in carpentry and joinery which were given to the candidates at a recent examination of the City and Guilds of London Institute. Two grades were recognized, known as the Ordinary Grade and Honors Grade. Fourteen questions were proposed in the first and 10 in the latter. If among cur readers there are any who are



*Post, Balusters and Rail.—⅜ Inch Scale.*

earnestly studying with the hope of acquiring a theoretical as well as a practical knowledge of the art of building, we suggest that an attempt to answer these questions will be a good method of self-examination. Should any of our readers undertake this and forward their papers to us for scrutiny we shall be glad to be of as much assistance to them as possible. The questions referred to in the two grades named were as follows :

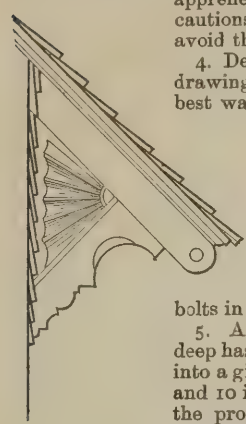
ORDINARY GRADE.

1. Give a description of pitch-pine timber, the forms in which it comes into the mar-

ket, the purposes for which it is best adapted in carpentry and joinery, and the best modes of converting it.

2. Describe English oak timber, and give a sketch section showing the best mode of cutting up the log, so as to produce ornamental boards for panels.

3. State the mode of proceeding to hang a good ordinary room door, the faults to be apprehended and the precautions to be taken to avoid them.



*Four-Room Cottage.—Hood to Kitchen Door. —Scale, ⅜ Inch to the Foot.*

4. Describe and show by drawings or sketches the best ways of scarfing timber: (1) In tension, as in tie-beams; (2) in compression, as in posts, and (3) subject to cross strain. Show modes of applying iron plates and bolts in such work.

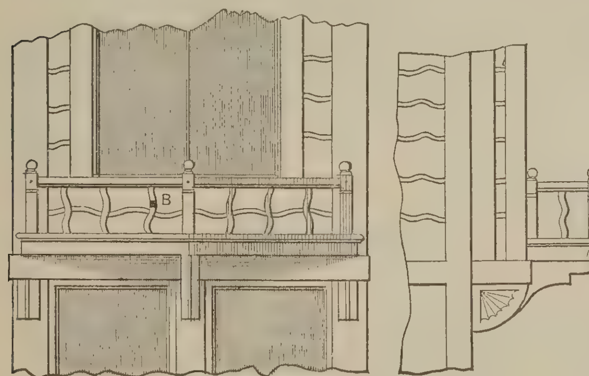
5. A binder 10 inches deep has to be tusk-tenoned into a girder 14 inches deep and 10 inches wide. Show the proportion of the parts of the tenon and the mode of fastening it into the girder.

6. Show good and suitable modes of making the following parts of an ordinary king-post roof truss: (1) Foot of principal rafter, with part of tie-beam; (2) head of king-post, with tops of principal rafters; (3) foot of king-post, with strut and tie-beam; (4) junction of strut, with principal rafter and purlin resting in its place. Show suitable straps or bolts.

7. Show by sufficient drawings the framed angle of a hipped roof, with dragon piece, &c.

8. Give a section showing the timbers of a curb or mansard roof of usual proportion for slating—span, 25 feet, with a room in the roof.

9. What is a good average distance from drip to drip in a trough gutter and the proper rate of fall? Show by drawings the construction of a drip and a cesspool ready to receive lead.

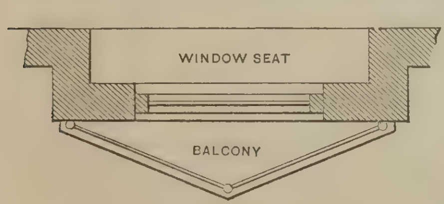




*Front and Side Elevations of Balcony.—⅜ Inch Scale.*

10. Give a section across a gutter formed between roofs, with bearers and preparation for lead and slating. Show, also, snow boards in gutter.

11. In making panels of unusual width (say over 2 feet) in deal doors and window backs, what precautions are necessary—in construction and fitting—to prevent damage from shrinking and from warping?





*Plan of Balcony.—⅜ Inch Scale.*

12. Give a plan of the winders to a quarter-space of a dog-legged staircase (width of staircase, 6 feet), showing the best way of arranging the steps in relation to the newel, so as to produce easy stairs.

13. What is the best rule for determining the proportion of tread to riser, and what should be the hight of risers where the treads are 8 inches, 9 inches and 11 inches, respectively.

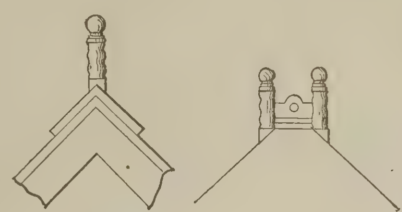
14. Draw tho dovetailing at angle of side and front of a drawer, so as to show the mode of cutting each of the two parts.

HONORS GRADE.

1. Make a working drawing, to a scale of 1½ inches to the foot, of a six-panel door, 3 feet wide, 7 feet high (suitable for a room), molded both sides, raised panels with molding on the rising. Show the mode of construction and suitable ironmongery. Give a full-size plan across part of stile and panel to show thicknesses and moldings.

2. Make similar drawings of paneled jamb linings and architraves, &c., for such a door in a wall one and one-half bricks in thickness, showing mode of fixing, with preparations to receive plaster and skirting.

3. Make similar drawings of a sash window to opening, 3 feet wide, 6 feet 6 inches high, top of sill 2 feet 9 inches from floor, with deal cased frames and oak sill set in 4½-inch reveal in one and one-half brick wall. Show boxing shutters with molded front shutter and suitable architraves, soffits, window backs, &c., and provision for stopping plaster and skirting.



*Finial and Cresting.—Scale, ⅜ Inch to the Foot.*

4. Make a working drawing for a ledged and braced outer door, with all usual ironmongery, the frame fixed in a one and one-half brick wall with 4½-inch reveal. Describe the means to be provided for fixing frames in wall.

5. Give a side elevation of a raking shore with a rider—total hight, 35 feet; projection at foot, 6 feet from wall. Show clearly the wedges, the joggle or pin going through the wall piece and the cleats, and describe the mode of fixing.

6. A pyramidal roof, with curved sides, is to be put on a tower that is 10 feet square externally. The outline is formed by striking each side with a 10-foot radius from the base or springing of the opposite side. Show the curved ribs and hips ready to receive boarding, also the mode of ascertaining by lines the curvature of the hips. Show the development of the surface of one side of the roof.

7. Give drawings for centering for brick groining over the crossing of two vaults, the span of each to be 12 feet and the arches semicircular. Show construction of the ribs and the mode of supporting them against the walls.

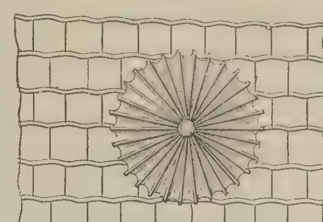
8. Give a plan of the level landing of a geometrical staircase, 12 feet wide in the clear, with a 3-foot well-hole, and show not less than two steps, 10-inch tread, 6½-inch rise, of each flight adjacent to it. Give the development of the surface of the well, with handrail of suitable hight from steps and from level landing.

9. Give a section of above-named handrail, and state, with suitable illustrations, how you would proceed to design its curves and get out molds for it.

10. Give a section of a skylight or lantern constructed on the flat top of a queen-post roof, the distance between queen-posts to be 13 feet; glazed sloping sides to be put about 3 feet 6 inches high, with sashes hung on centers, the top to rise at an angle of about 30°. Show clearly the way the framing is designed to exclude rain.

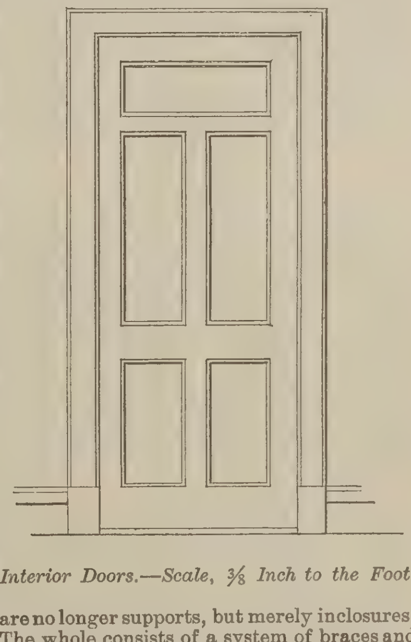
## Roman and Gothic Construction.

Viollet le Duc, the celebrated French architect, contrasts Roman and Gothic construction in the following terms: With the earliest Gothic architects the arch was of the first importance; it was the essence of all



*Rosette over Stair Window.—Scale, ⅜ Inch to the Foot.*

their vertical construction, and was the ruling element, not only of construction, but also of form; the whole of their architectural principles were really based upon it. The Romans in a great number of cases based their constructional methods entirely upon the arch, but still the chief point of support in their architecture was always a solid and inert mass. Even their vaulted buildings appear as if carved from a single block, such blocks being nothing but gigantic moldings. The architects of the twelfth century, on the other hand, gave useful work to each separate part. Their columns are veritable supports; their spreading capitals help to bear the load; when the profiles and ornamentation of their capitals are greatly developed, it is because such development is necessary. Their vaults are divided into many intersecting arches, because these arches are nerves, each fulfilling its proper function. The stability of vertical points of support depends upon their being efficiently propped and counterweighted; every arch thrust finds itself met by some other compensating thrust. Walls disappear; they



*Interior Doors.—Scale, ⅜ Inch to the Foot.*

are no longer supports, but merely inclosures. The whole consists of a system of braces and trusses, maintained in their places, not by their mass, but by a nice calculation and combination of opposite and reciprocally annihilating forces. The vault is not a mere crust, a covering in a single piece, but an intelligent combination of ever-active pressures, weighing upon certain bases arranged to receive them and transmit their force to the ground. Profiles, sections of ornaments, are so designed as to aid the comprehension of the mechanical truths employed. These deeply-cut profiles fulfill in a very perfect manner a purely useful function.

(*Concluded from page 4.*)

season of the year than in those months when there is a less pressing need of their goods. The cards in our columns included many different varieties of heating appliances. Edwin A. Jackson & Bros. directed attention to the Jackson Ventilating Grate, which has been in successful use for a term of years. W. Jackson & Son called attention to a general line of grates and open fireplaces. W. H. Harrison & Bro. mentioned plain and artistic grates, together with furnaces and ranges. B. C. Bibb & Son called attention to Bibb's Baltimore heaters, and James Spear illustrated the New Golden Sun fireplace heater. The Raymond Furnace and Mfg. Co. directed attention to their different styles of grates, fireplace heaters and furnaces, while J. Reynolds & Son exhibited the special merits of their shaking and clinker-grinding grate. The Carton Furnace Co. presented testimonials commending their furnace, and Graff & Co. solicited correspondence with all who are needing cast or wrought iron furnaces. The Smith & Anthony Stove Co. invited requests for their little book entitled "Sanitary Heating and Ventilation," and the Richmond Stove Co. directed attention to their Triumph furnace. The Boynton Furnace Co. presented their grate, with brief enumeration of other goods, while Beecher & Smith called attention to the Beecher furnace. J. C. Henderson described the peculiarity of his dome furnace, and the J. F. Pease Foundry Co. described their combination furnace and steam heater. The Utica Steam Gauge Co. offered to take contracts for warming buildings of all descriptions by steam under the patents which they control, and the Eureka Steam Heating Co. directed attention to the 24 sizes of low-pressure generators which they manufacture. Le Bosquet Bros. invited the trade to send for descriptive pamphlet of their steam heating apparatus, while the Combination Co. directed attention to Page's recent improvements in steam heaters. The Duplex Steam Heater Co. presented a cut of one form of their apparatus, and tendered a catalogue and price list, while Hobbs, Gordon & Co. also invited the trade to send for catalogue of steam heating appliances.

MANTELS.

Mantels are intimately associated with certain forms of heating apparatus. Fischer, Leaf & Co. directed attention to marbleized iron and slate mantels, and Poulson & Eger referred to work of this kind in bronze, brass, electro-plate and oxidized iron. Slate mantels were mentioned by Samuel H. French & Co. They were likewise referred to by Chas. B. Kline and the S. Hand Mfg. Co.

ELEVATORS, ETC.

Elevators and hoists are absolute necessities in various classes of modern building. J Q. Maynard illustrated the Wythe Automatic Safety Hoist, and W. S. Richards & Co. directed attention to Murtaugh's Dumb Waiters. Stokes & Parrish presented their cards as manufacturers of hoisting machinery in general, and L. S. Graves & Son directed attention to screw-geared and hydraulic passenger and freight lifters. Butler & Constant showed Cannon's Dumb Waiter. Morse, Williams & Co. illustrated safety hatchway attachments applied to their freight elevator.

IRONWORK.

Structural iron work was presented by the Phœnix Iron Co. and Carnegie Bros. & Co. Ornamental iron work in the form of railings, cresting, &c., was presented by C. W. Wall, the Hanika Iron Fence Co., J. E. Bolles & Co., C. F. Hollingshead & Co , the National Wire and Iron Co. and the Van Dorn Iron Works. Cheney & Hewlett called attention to architectural iron work in general, as also did Samuel J. Cresswell. The sheet-metal interests were represented by the Scribner Roofing and Cornice Co., Knisely & Miller, E. Van Noorden & Co. and Charles Wuichet & Co., all of whom directed attention to a general line of cornices, roofing work, &c. The Hayes Skylights, in addition to being mentioned in some of the cards above referred to, were also presented by the card of the patentee. J. S. Pardessus illustrated and described his Dome Exhaust Ventilating Cap and other patented novelties. Bickelhoupt's Skylights were presented by the makers. Weather vanes and other exterior ornaments were shown by Thomas W Jones, while Samuel S. Bert & Son directed attention to stable fittings, roof crestings, &c.

DOOR-HANGERS.

Sliding door-hangers of the Warner variety were presented by E. C. Stearns & Co. The Cohoes Iron Foundry and Machine Co. presented ball-bearing door-hangers, while the Climax Rail Co. called attention to the form of rail which they manufacture for use with sliding doors. Cronk Hanger Co. showed wrought-iron barn-door hangers and other specialties which they manufacture.

HARDWOOD LUMBER, ETC.

Fancy lumber and wood decorations also had attention. Wm. E. Uptegrove & Bro. directed attention to mahogany, of which they make a specialty. Geo. Hagemeyer presented his card as dealer in hardwood lumber of various varieties. The Standard Wood Turning Co. called attention to machine-turned balusters and other forms of stairbuilders' materials. The New York Lumber and Wood Working Co. called attention to square turned work, and the Taft Co. directed attention to their natural-wood ornaments.

WINDOW FURNITURE.

Window fixtures, including sash furniture and blinds, commanded a good share of our our space. Brohard & Co. called attention to their sash-holder. The Palmer Mfg. Co. presented their frame pulley. Robert B. Huginin directed attention to his adjustable sash balances, being a mechanical substitute for weights. The Schumard Sash Balance Co. presented the Schumard Sash Balance. The Universal Shutter Worker was shown by the Dudley Shutter Worker Co., and A. H. Dodd presented the Little Gem Blind Worker. J. R. Clancy illustrated Liesche's Burglar-Proof Sash Lock. The Acme Sash Cord was shown by the Coiled Wire Belting Co. Henry F. Jenks presented his cord grip, and C. Sydney Norris & Co. showed the advantages of the Norris Pulley Mortiser, as well as the Norris Pulley. J. W. Raymond directed attention to compressed-lead sash-weights. The merits of the Giant Metal Sash Chain were presented by the Smith & Egge Mfg. Co., while Thomas Morton illustrated his metal cable sash chains. Rolling venetian blinds were shown by J. G. Wilson, and Clark, Bunnett & Co. directed attention to their noiseless self-coiling revolving steel shutters. William Willer presented an illustration of his patent sliding blinds.

MISCELLANEOUS.

Masons' materials were represented by several cards. Erskine W. Fisher presented patent soapstone finish. Henry D. Dupee directed attention to architectural shapes and colors. S. Cabot presented his black and red mortar colors, and Samuel H. French & Co. directed attention to Peerless Black for mortar. Building paper was advertised by the Scott Paper Co., and creasote wood stains by Samuel Cabot, Jr. Paints were represented by F. W. Devoe & Co. and Robert Colgate & Co., with incidental mention upon the part of other manufacturers in connection with lines of goods elsewhere mentioned in this enumeration. The Shaw Door Check and Spring Co. presented their device for controlling the motion of doors, and the Richmond Weather Strip Co. directed attention to their improved form of weather strip. F. A. Reiher called attention to his improved self-locking transom lifter, while J. F. Wollensaks illustrated his transom lifter and lock. Decorative glass was presented by John Matthews, Redding, Baird & Co. and J. & R. Lamb. Encaustic tiles were represented by Sharpless & Watts, the Star Encaustic Tile Co. and Alfred Boote. Motive-power for operating machinery, passenger elevators and the like also received attention. W. F. Morris urged the trade not to buy an engine until his circulars and prices had been inspected. Schleicher, Schumm & Co. directed attention to the merits of the Otto Gas Engine. William T. Comstock and G. S. Woolman called attention to drawing instruments. John W. Harmon called attention to his plumbing and leveling instrument, W. R. Ostrander to his oral annunciator, and G. W. Howell showed his patent rain-water cut-off. The Mason Regulator Co. offered to cure smoky chimneys, and J. H. Serene called attention to the advantage of soapstone wash-trays, sinks, &c. The American Bangor Slate Co. presented the merits of Pennsylvania black roofing slate, and Henry Brooks & Co. showed the merits of Ryan's Shingling Bracket. Storm thresholds made of iron were presented by Schenck's Adjustable Fire-Back Co., and a general line of sash, blinds, doors and carpenters' tools was mentioned by Everson, Frisselle & Co. Lawrence Mendenhall, as manufacturers' agent, directed attention to a line of specialties, and the Composite Iron Works illustrated the Mackaye Safety Opera Chair. The Stanley Corrugated Fire-Proof Lathing Co. called attention to fire-wire lathing of their manufacture, and Hammacher, Schlemmer & Co. presented steel wire nails. J. P. Frink showed the "Great Church Light," and the American Well Works presented their apparatus for sinking wells. Life insurance on the co-operative plan for builders, &c., was presented by A. J. Bicknell. The professions were represented by H. M. Hitchings, lawyer; Chas. E. Illsley, architect, and E. B. Stocking, patent solicitor. There was one advertisement for a situation wanted, signed by a *non de plume*. The literature of the trade was presented by the cards of William T. Comstock, who directed attention to new books; I. P. Hicks, who described his little manual, and W. A. Sylvester, who mentioned the "Modern House Carpenters' Companion." Except for being thorough, as promised at the outset, we might refrain from mentioning our own book advertisements, which were distributed among different portions of the paper. "How to Keep a Store" is a volume that was described *in extenso*, and "Law Without a Lawyer" is another that was similarly presented. A page described the "Practical Estimator," and the "Handy Estimate Blanks," while another contained a list, with brief description, of books useful to architects, carpenters and builders.

Such, in briefest possible manner, is a description of the contents of a single number of *Carpentry and Building*. There would seem to be comparatively few wants experienced among architects, builders and wood-workers in general in which this journal does not offer substantial assistance.

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One of the technical journals devoted to brick-making gives the following general particulars to be observed in using this material: 1. To reject all misshapen and unsound bricks. 2. To place the beds of the courses perpendicular, or as nearly perpendicular as possible, to the direction of the pressure they have to bear, and to make the bricks on each course break joints with those of the courses above and below by overlapping to the extent of from one-quarter to one-half the length of a brick. 3. To cleanse the surface of each brick and to wet it thoroughly before laying it, in order that it may not absorb the moisture of the mortar too rapidly. 4. To fill every joint thoroughly with mortar, taking care at the same time that the thickness of mortar shall not exceed about ¼ inch. In order to prevent the use of too great a thickness of mortar, it is usual in specifications to prescribe a certain depth which a certain number of bricks shall not exceed. For example, if the bricks are 2¾ inches deep, it may be specified that four courses of bricks, when built, shall not measure more than 1 foot in depth, a condition which implies that the average thickness of mortar in the joints shall be ¼ inch. 5. To use no bats or pieces of bricks except when absolutely necessary in order to make a "closure"—that is, to finish the end or corner of a wall, or the side of an opening—and even then to use no piece less than half a brick.

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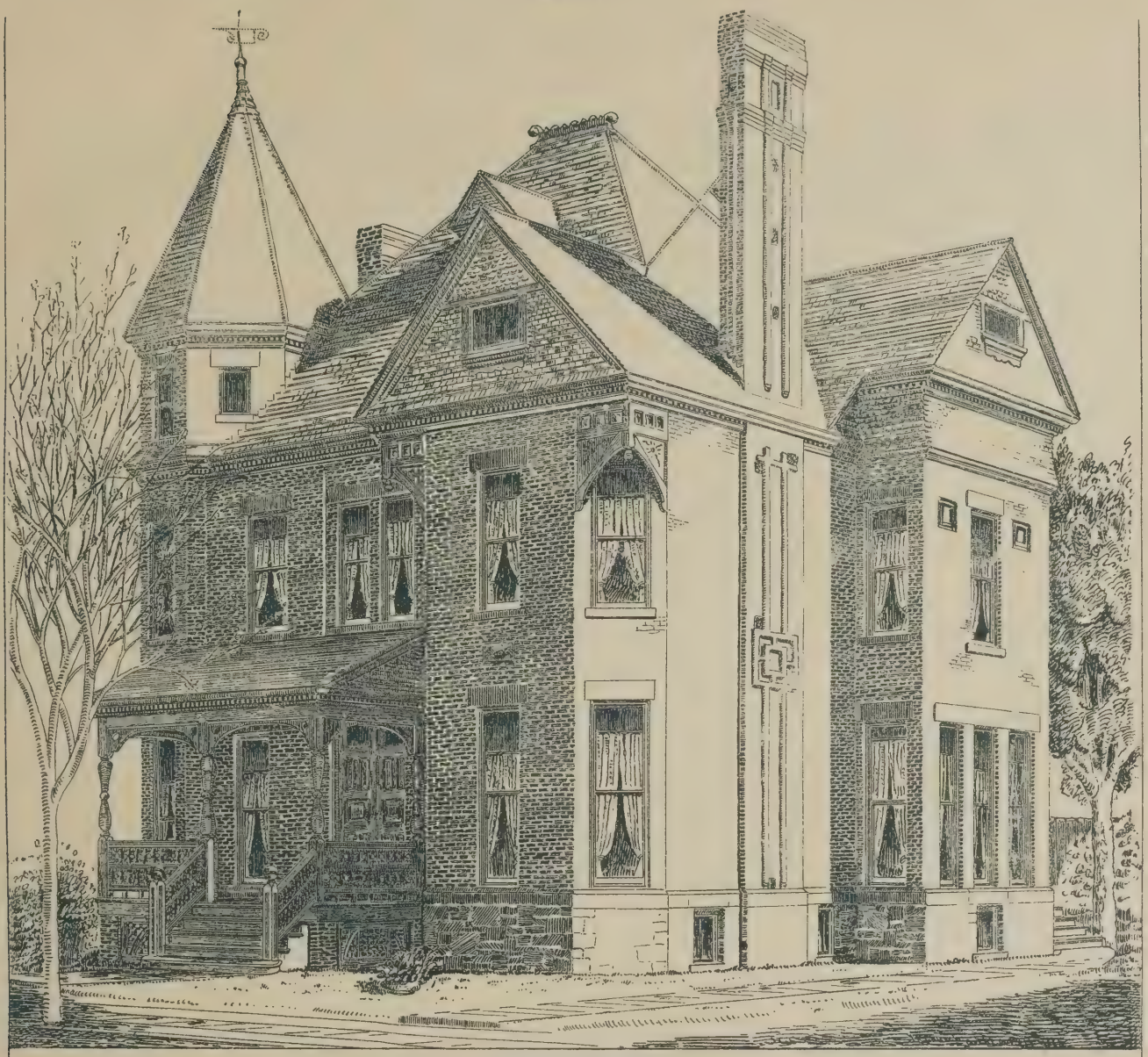
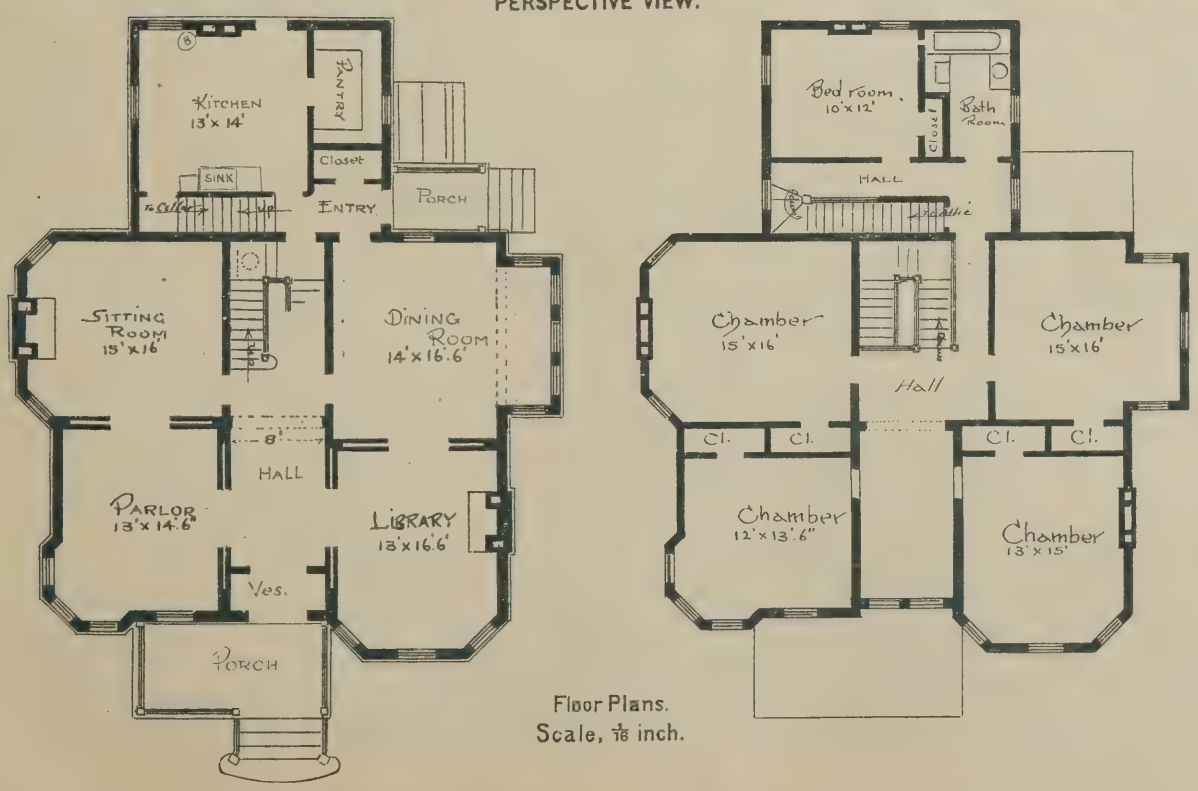
The annual report of the Building department shows that during last year 3902 buildings were erected in the city of Brooklyn, at an estimated cost of $19,411,042.

PLATE I.



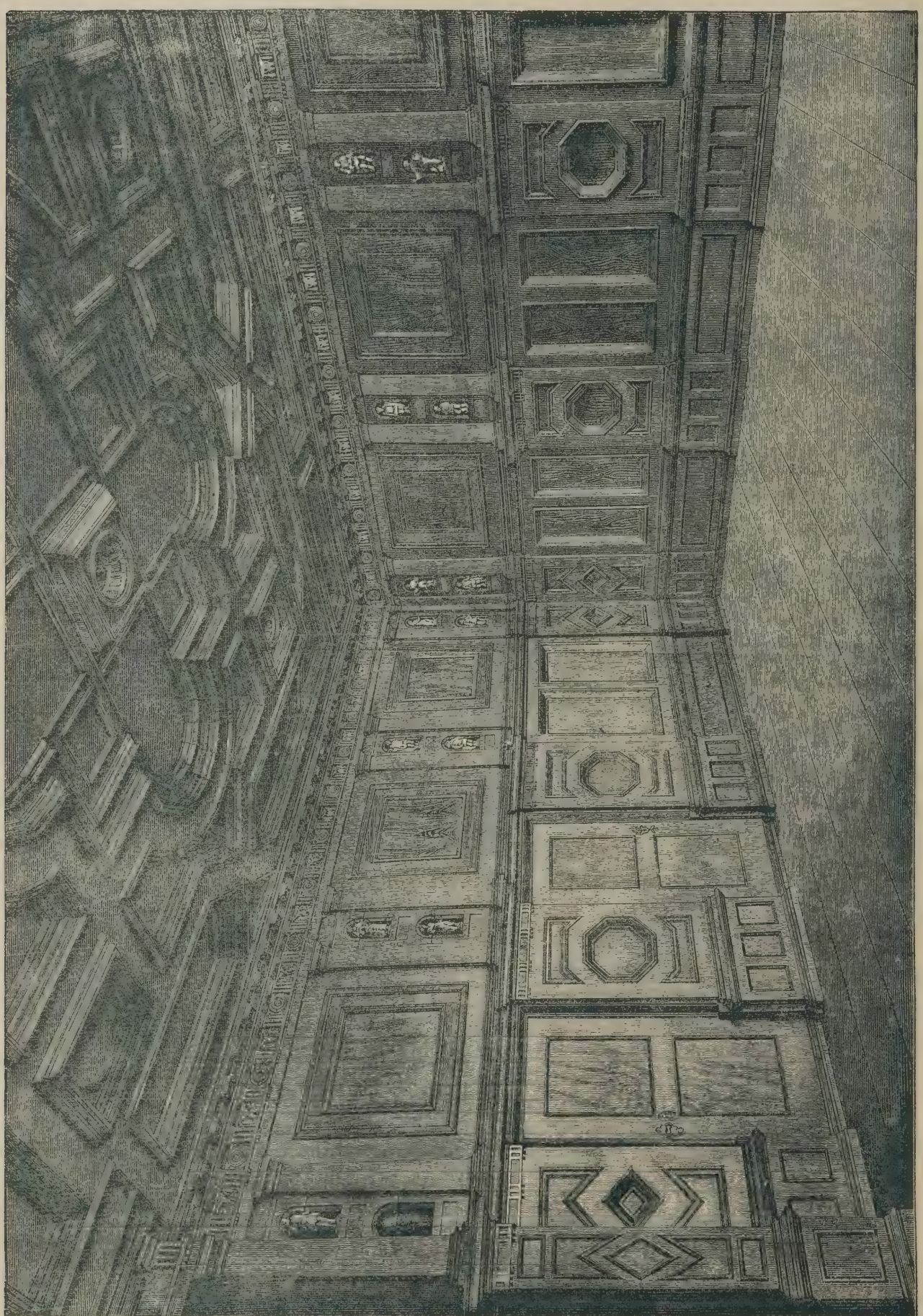
PERSPECTIVE VIEW.




Floor Plans.
Scale, $\frac{1}{16}$ inch.

RESIDENCE OF MR. HENRY M. HILL, ROCHESTER, N. Y.

PLATE II.



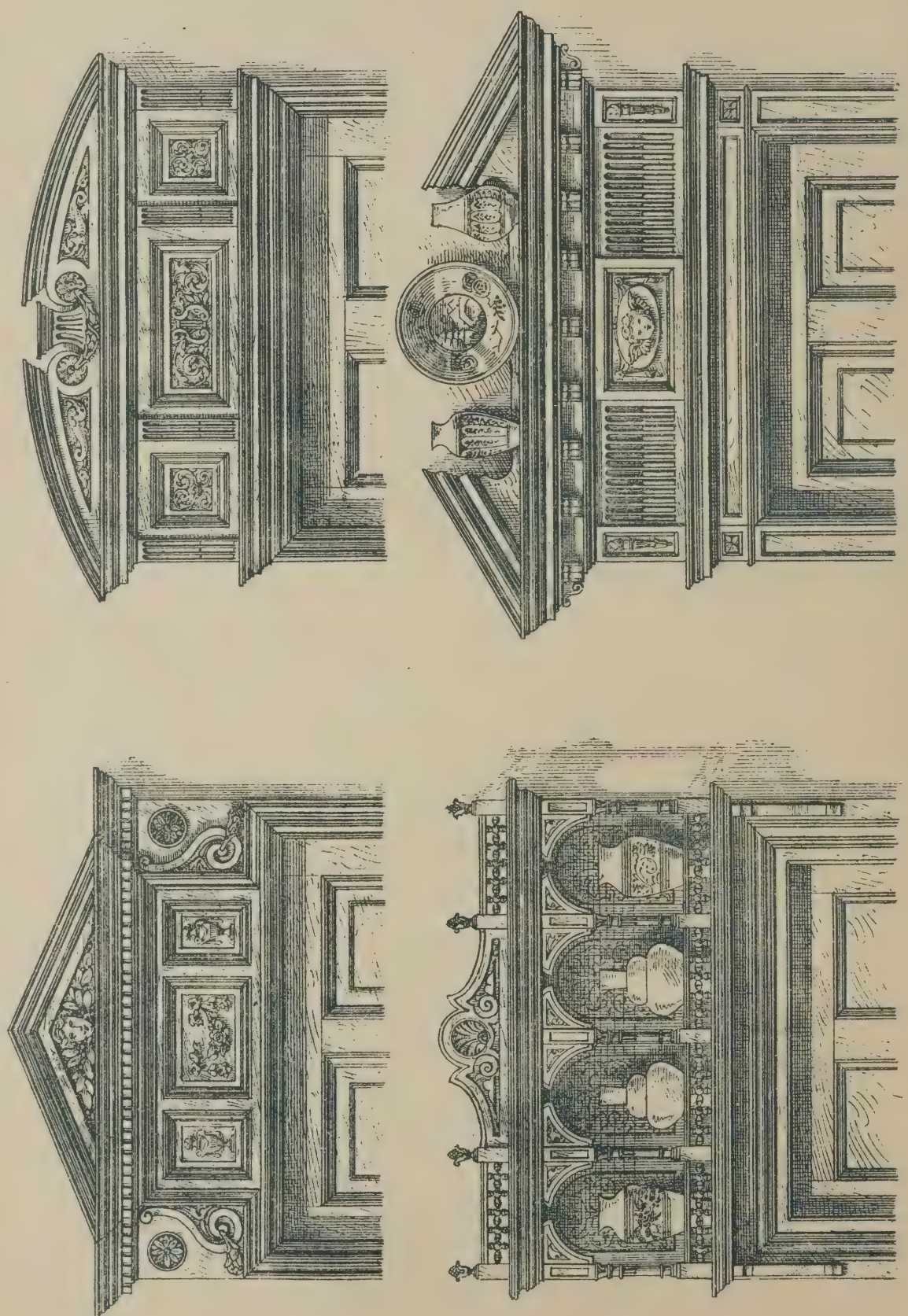
OLD ROOM FROM NUREMBURG, ILLUSTRATING FIFTEENTH CENTURY CABINET-WORK IN OAK.

# AUBURN FREE BAPTIST CHURCH,

## AUBURN, R. I.

GOULD & ANGELL, ARCHITECTS, PROVIDENCE, R. I.

PLATE IV.



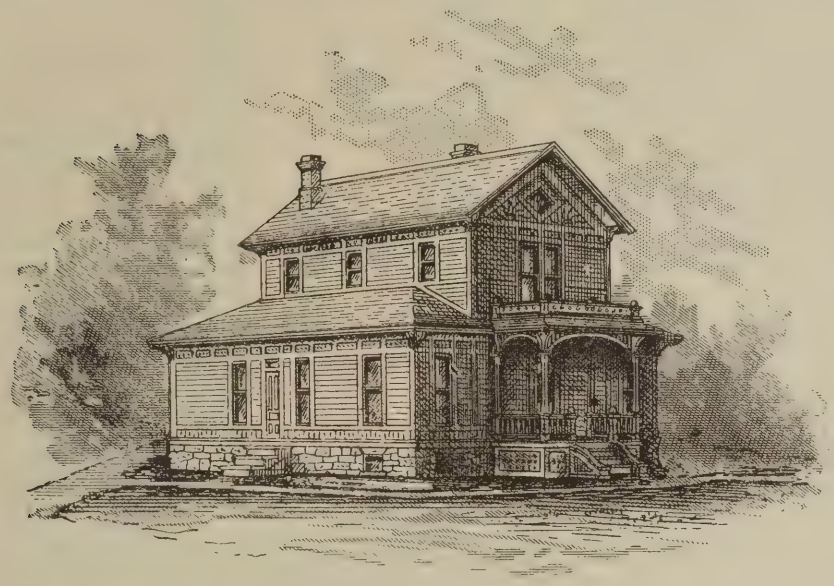
DESIGNS FOR "OVER-DOORS" BY R. BROOK.

# CORRESPONDENCE.

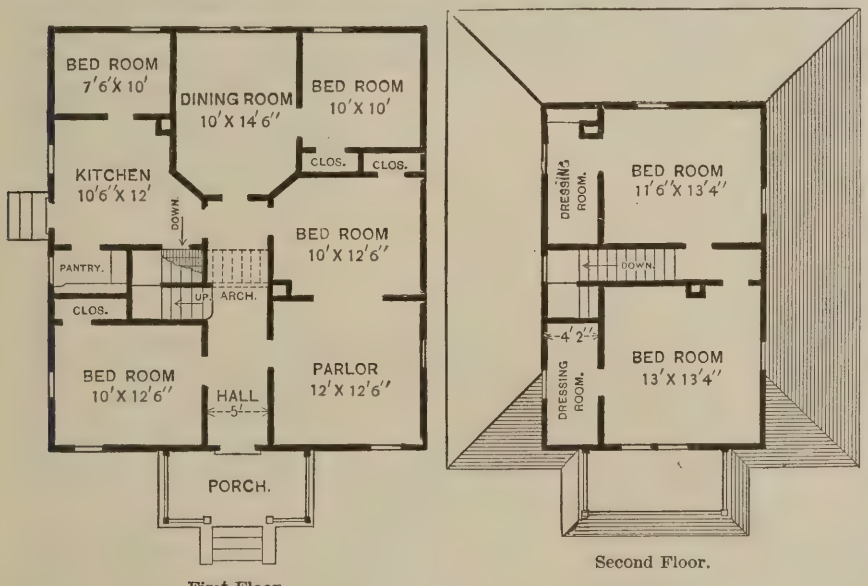
### Bedrooms on the Ground Floor.

*From* CHARLES N. CORNELL, *Washington, D. C.*—Inclosed herewith I send sketch of a house of small cost and an arrangement of rooms that I think will meet the requirements of "C. D. J.," of Norwalk, Pa. I send this in answer to the communication in the November number of *Carpentry and Building.*

*Note.*—We have engraved the floor plan and perspective view inclosed by this correspondent and present them herewith. Many of our readers will recognize the author of these plans as an old acquaintance, for he has in the past, writing from Alpena, Mich., sent other sketches. We understand that Mr. Cornell is now permanently located in Washington in the practice of his profession.



*Perspective Sketch of House, Submitted by Mr C. N. Cornell.*




First Floor. Second Floor.

*Floor Plans Accompanying Design from Mr. Cornell.—Scale, $\frac{1}{16}$ Inch to the Foot.*

### Sweating Chimney.

*From* C. W., *Minnesota Junction, Wis.*—I have a chimney that sweats so badly that it is black from top to bottom. The creosote has gathered in the second story and the plaster is black all around it for the space of a foot or more. The chimney starts in the second story and goes up through the roof. The creosote comes down through the first story very badly by spells. I want to know if there is danger of the brickwork rotting, so as to make the chimney unsafe. The house stands on a small hill, and is 2½ stories high. The chimney has a very strong draft, and burns out in winter or spring on an average of about once in three months. Fire is kept all night in winter, but during the spring only in daytime. Wood is the fuel used.

*Note.*—The difficulty of which our correspondent speaks is likely to be more of an annoyance to him than an element of positive dandger. One of the results of combustion, especially where green wood is employed, is water, or rather steam, which condenses on the inside of the chimney and causes the trouble to which he refers. Our correspondent seems to be anxious in regard to the safety of the chimney simply on this account. We should not feel entirely comfortable with a chimney built on a floor of a dwellnig instead of extending to the ground, whether there was trouble from sweating or not. More especially would this be the case where the chimney was subject to frequent burning out, as mentioned in this case. The difficulty of pointing out an adequate remedy is considerable, owing to the conditions under which the chimney is built. If the chimney extended to the ground instead of terminating on the floor above the first story, as described, there would be no annoyance on the first floor from the cause named. In this case the thimbles entering the chimney might be slightly inclined inward, so as to avoid the danger of the disfiguring liquid finding its way to the outside of the chimney, thus damaging the plaster.

### Building Association Problem.

*From* G. W. S., *Detroit, Mich.*—In the building association problem given in your June number, "J. L." states that "somewhat similar problems are solved by geometrical progression." Had he said "exactly such problems," he would be correct. We may deduce a rule as follows:

Let $a$ = monthly payment.
$p$ = sum lent.
$r$ = rate per cent. (decimally.)
Then at the end of one month,
$p + pr - a$ = sum due.
At the end of two months,
$p + pr - a + pr + pr^2 - ar - a$ = sum due.
At the end of three months,
$p + pr - a + pr + pr^2 - ar - a + pr + pr^2 - ar + pr^2 + pr^3 - ar^2 - ar - a$ = sum due. (1)
And if the debt and interest were then paid this would be 0. We need not carry the process further, as this is sufficient to illustrate. Transposing (in 1) we have:
$p + 3pr + 3pr^2 + pr^3 = 3a + 3ar + ar^2$,
or $p(1 + r)^3 = 3a + 3ar + ar^2$. (2)
To sum the second member (of 2) multiply by $r$, and then add $a$; then
$a + 3ar + 3ar^2 + ar^3$, or
$a(1 + 3r + 3r^2 + r^3)$ (3), or
$a(1 + r)^3$. From this subtract $a$, and then divide by $r$; then (3) becomes
$$\frac{a(1 + r)^3 - a}{r}.$$
And our analysis therefore gives:
$$p(1 + r)^3 = a\,\frac{(1 + r)^3 - a}{r}, \text{ or}$$
$$pr(1 + r)^3 = a(1 + r)^3 - a, \text{ or}$$
$$pr = a - \frac{a}{(1 + r)^3}.$$
In the given problem this becomes
$$1000\,r = 60 - \frac{60}{(1 + r)\,20}$$
The solving of this equation without the aid of logarithms is a herculean operation, which at present, as I have not access to a table of logarithms, I shall decline. It will be seen that we have three terms given—principal (1000), time (20) and payment (60), which brings the question under the head of "Annuities by Geometrical Progression."

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*From* W. R., *Verona, Pa.*—I think "J. L.," in the November issue of *Carpentry and Building*, should be more comprehensive in his attack on the answer to the problem in question, published in the September number. The solution treated the problem as one of simple interest, and upon that hypothesis the answer is correct, and is so easily verified that I will not go into details here, but will give the following solution for the consideration of the readers of your valuable paper, considering the problem one of compound interest, with monthly intervals, makes it somewhat difficult, and involves some algebraic notation.

In this problem we have three parts, viz., the first term, the number of terms and the present worth. Let $x$ equal rate per cent. We then have this rule: "Raise the ratio $\left(1 + \frac{x}{100}\right)$ to a power indicated by the number of terms (20), and subtract 1 from the result; then multiply this remainder by the first term (60), and divide the product by the ratio less 1 $\left(\frac{x}{100}\right)$; divide this by the amount of $1 for the time at the rate, which is $\left(1 + \frac{x}{100}\right)^{20}$, and we have the present worth ($1000)." $\left(1 + \frac{x}{100}\right)^{20} = 1 + 20\left(\frac{x}{100}\right) + 190\left(\frac{x}{100}\right)^2 + 1140\left(\frac{x}{100}\right)^3 + 4845\left(\frac{x}{100}\right)^4 + \ldots$

Subtract 1; multiply by 60; divide by $\frac{x}{100}$ and simplify $= 1200 + 114x + 6.84x^2 + 0.29x^3 + \ldots$; hence

$$\frac{1200 + 114x + 6.84x^2 + 0.29x^3 + \ldots}{1 + 20\,\frac{x}{100} + 190\left(\frac{x}{100}\right)^2 + 1140\left(\frac{x}{100}\right)^3} = 1000.$$

Clearing of fractions, $1200 + 114x + 684x^2$

$+ 0.29x^3 = 1000 + 120x + 19x^2 + 1.14x^3.$
$0.85x^3 + 12.16x^2 + 86x = 200$
$x = 1.8061$

### Glass Sash Pulleys.

*From* S. W., *Newark, Ohio.*—Answering the request of "A. S.," of Nashville, Tenn., I would say that while working in Grand Rapids, Mich., in 1873, glass pulleys were being introduced, and were used in the building upon which I was working at that time. They appeared to me to be the article. They were noiseless and frictionless, the pulley being stationary, the rope simply passing over by means of a hollow crease. The saving in the weight would almost pay for the pulleys. I have a card that was handed to me at that time and which has been laid away so carefully for preservation that I only came across it a short time since. This card contains sizes of sash, their weight, and the number of pounds of sash weights required to run the same, using the glass pulleys. The goods were manufactured, or at least sold, by A. A. Weeks, 105 John, street, New York.

*Note.*—Our correspondent's letter above affords very little information in addition to what is already very generally known in the trade. Mr. Weeks, we believe, has not been in business for a number of years, and, if our information is correct, at the time that he gave up the trade the manufacture and sale of the pulleys were commenced by a company in Brooklyn. They, too, have passed out of action. So far as our inquiries go, glass pulleys are at present entirely out of the market.

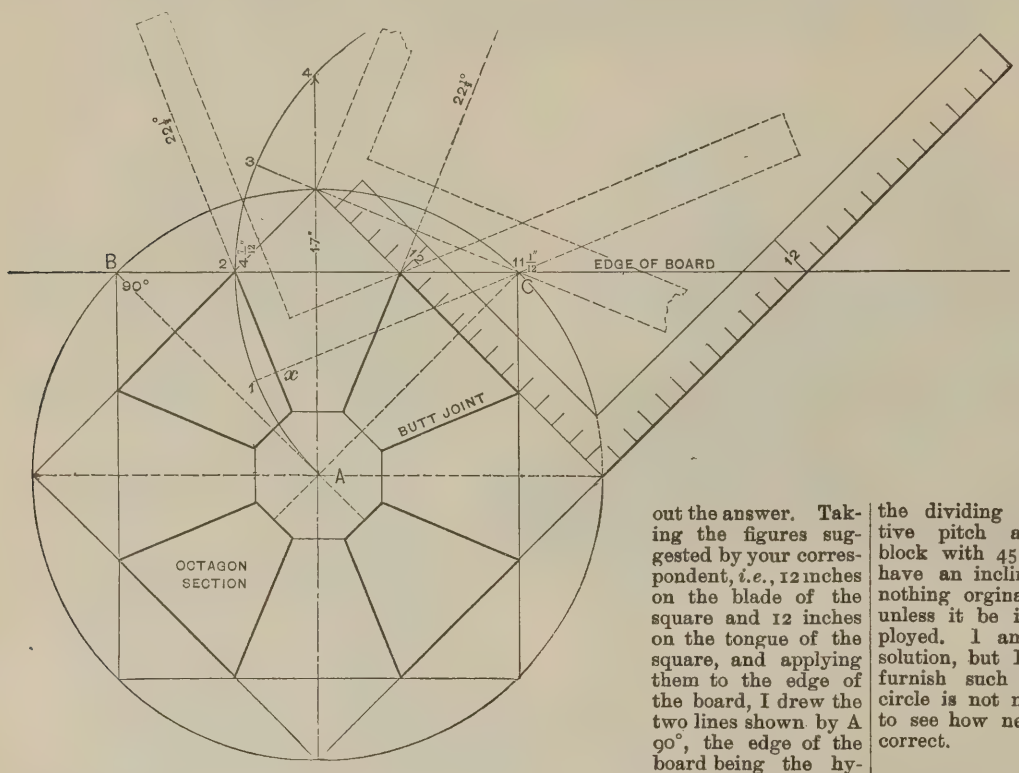
### Roofing Nails.

*From* H & K., *Richmond, Va.*—We have a large roof to cover, on which tin laid flat-seam is to be used. No roofs of this kind have been put on in this city in the past, and accordingly we are not clear as to what we should use. The tin is to be nailed through the sheets, no cleats being used.

*Answer.*—Different roofers prefer different sizes of nails, their preference being governed by various considerations. Nails from ⅞ inch to 1¼ inches in length are very commonly used in laying flat-seam roofs, the larger nails being preferred for their convenience in nailing, while, on the other hand, the shorter nails seem to be the best, because they do not extend clear through the sheeting-boards. A barbed-wire nail is probably better for use in such places than an ordinary cut nail.

### Octagon Cuts by the Steel Square.

*From* L. W. F., *Upper Alton, Ill.*—Since you invite answers to the question suggested by "F. P. W.," of Columbus, Ohio, presented in the November number of *Carpentry and Building*, I will inclose a reply to the question as I understand it, accompanied by a diagram showing what I did in working out the answer. Taking the figures suggested by your correspondent, *i.e.*, 12 inches on the blade of the square and 12 inches on the tongue of the square, and applying them to the edge of the board, I drew the two lines shown by A 90°, the edge of the board being the hypothenuse of the triangle and is 17 inches long. I then divided that part of the diagram into two sections of 45° each. I then bisected the two angles, obtaining the two lines A 22½°, which divides one-quarter of the whole figure in four equal angles of 22½° each. These are the butt joints of the octagon angle. The complete figure is given in light and heavy lines showing the octagon blocks or sections. I next placed one foot of my dividers in point C and drew the segment A 1 2 3 4, the chord of which is 17 inches, the same length as the hypothenuse already mentioned on the edge of the board. This was really drawn below and placed above to show its relations to the board, and to assist in answering your correspondent's question, as I understand it. The arc is divided into four equal parts of 22½° each, the same as the quarter-circle between B and C. Placing the square on the edge of the board as shown, and fitting the octagon joint, I find the heel of the square at *x*, opposite division 1, removed from A 22½°, while the tongue is 22½° from the corner B. As the square now lies the number on the blade is $11\frac{1}{12}$ at the corner C, while on the tongue at the point A is $4\frac{7}{12}$, making the hypothenuse 13½ inches along the board edge, being three-fourth of the 17. Your correspondent's figures 6 and 12 will make this length greater. By sliding the square down $\frac{5}{12}$ inch—that is, to 5 inches and 12 inches on the board edge—it will fit the joint. Continuing in the same direction to the line A *b* will give a full right angle, or one-quarter of the circle, containing 90°. By keeping the heel at the center A and swinging round 22½° at each move, marking as we go, will give all the 16 divisions shown. The square shown at the right indicates the application in obtaining the pitch of two of the sides. The square above is laid on the dividing line 3 C, showing its relative pitch and inclosing an octagon block with 45° base, while the two sides have an inclination of 22½°. There is nothing orginal about this demonstration, unless it be in the use of the lines employed. I am not claiming a complete solution, but I have no doubt others will furnish such an answer. The complete circle is not necessary. I drew it simply to see how near the points come to being correct.




*Octagon Cuts with the Square.—Diagram Accompanying Letter from L. W. F.*

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*From* J. H. L., *Council Bluffs, Iowa.*—In reply to "F. P. W.," of Columbus, Ohio, who asks why 6 and 12 on the square will not give the octagon cut, I submit the following: Referring to the diagram inclosed, which represents a quadrant, the line A D forms an angle of 45° with the line A E. A F is on an angle of 22½°, and it represents the required octagon cut. A B and B E, which are at right angles to each other, are of equal length, and they show the position of the square for a miter cut. Divide A B and B E each into 12 equal parts representing inches, also fix the point 6 on the square A E. The distance across the square from 12 to 12 is the radius of the circle E G, through which the point 12 on the blade of the square will pass in moving up or down. D F E is an arc of the circle, and D E the chord of the arc. D E ought to be the same length as the distance B E on the square if 6 and 12 gave the octagon cut. Further, the chord D E ought to mark the position of one side of the square, and the point 6 on the square should be at *h*, the latter being the middle point of the chord D E. All three of these propositions are incorrect, which satisfactorily proves that 6 and 12 cannot be the octagon cut. The diagram shows that 5 and 12 give the points desired.

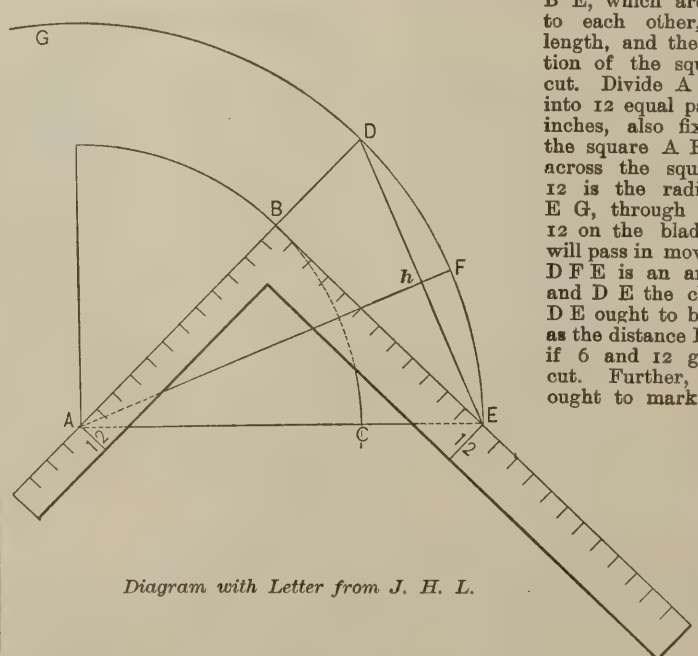


*Diagram with Letter from J. H. L.*

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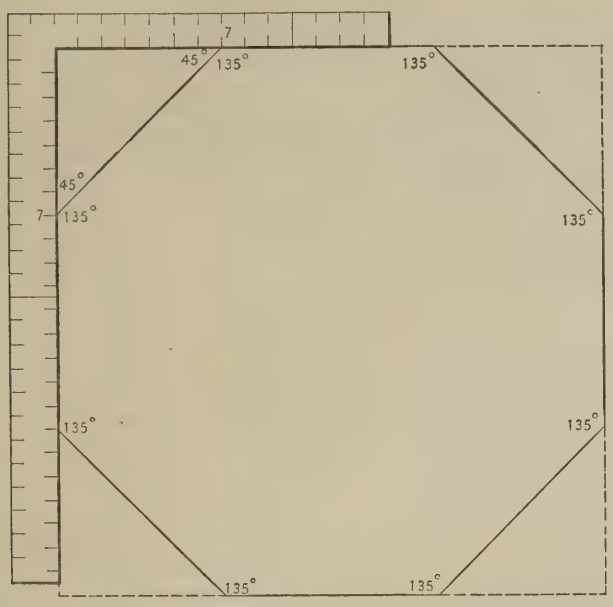
*From* W. R., *Verona, Pa.*—I desire to inform "F. W. P.," whose question is proposed in the November number of *Carpentry and Building* that the reason the proportion he suggests does not hold good is due to two causes. First, the interior angles of an eight-sided figure are not double those of a four-sided figure. Sec-

ond, the sides of a triangle are not proportional to the opposite angles, but to the sines of those angles. Let us see what the cut will be for an octagon. "The sum of all the interior angles of any polygon is equal to twice as many right angles, less 4, as the figure has sides." Hence, there are 12 right angles, or 1080°, in the interior angles of an octagon, and, as there are eight of these angles, each will be equal to one-eighth of 1080, or 135°. If the interior angle is 135°, the exterior angle, or the angle between the side of the square and the side of the octagon, must be $180° - 135° = 45°$. But this is the miter; hence the miter is the cut for an octagon. The accompanying sketch shows an octagon laid out, taking 7 and 7 on the square, which makes the side of the figure about 10 inches.




*Octagon Cuts with the Square.—Diagram with Letter from W. R.*

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*From* F. W. B., *Hoosick Falls, N. Y.*—In the November number "F. P. W." wants to know why 6 and 12 will not give the cut for an octagon miter when 12 and 12 will give the cut for a square miter. I cannot see what the cut for a square miter has to do with the cut for an octagon miter. 5 and 12 will give the cut for an octagon miter and that is the reason why 6 and 12 will not. In any polygon the sum of all the angles is equal to twice as many right angles, less 4, as the polygon has sides; hence the sum of all the angles in a regular octagon is 12 right angles, or 1080°, and each angle is equal to 135°, and the miter of this is 67° 30′. The angle included between the sides of a square is 90°, and the miter of this is 45°. Now let us see what numbers on the square will give the cuts for these angles. The blade and tongue of a square, and the straight edge or line to which they are applied, form a right-angled triangle of which the straight edge or line is the hypothenuse and the blade and tongue of the square the other two sides. Let A B and A C, Fig. 1, be the sides of a square applied to a line B C, so as to give an angle of 45°, or the cut for a square miter at B. The sum of all the angles in any triangle is two right angles, and as A is one right angle, or 90°, B and C must be together equal to 90°, and as B is 45° C must be 45° also. Now, B and C being equal angles, the sides opposite them must also be equal—that is, if the side A C is 12, the side A B must also be 12. In Fig. 2 let the square be applied so that A C is 12 and the angle at B 67° 30′, or an octagon miter. It is required to find A B. Now A is 90°, B is 67° 30′; hence C is 22° 30′, and as the sides of a plane triangle are to each other as the sines of their opposite angles we have this proportion: Sine B : sine C :: A C : A B. This gives the length of A B, 4.97, or 5 will be accurate enough in practice. If A C is 12 and A B is 6, we shall have in the triangle A B C, A C : A B :: radius : tangent C. This gives the angle C 26° 33′ 54″, and the angle B 63° 26′ 6″. This is why 5 and 12 will give the cut for an octagon and 6 and 12 will not.

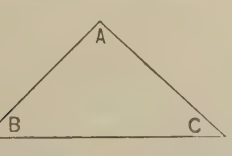


*Fig. 1 of Sketches Accompanying Letter from F. W. B.*

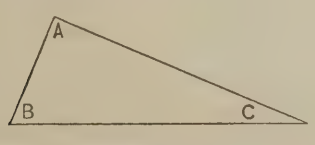


*Fig. 2 of Sketches from F. W. B.*

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*From* C. J., *Omaha, Neb.*—In answer to the inquiry of "F. P. W.," of Columbus, Ohio, I would say that the reason why 12 and 6 will not give the cut for an octagon (20° 30′) when 12 and 12 give a cut for miter (45°) is because the tangent of 22° 30′, the radius being 12, is equal to 4.97052, whereas the tangent of 45° equals 12. I will give the following rule for determining the cuts by the steel square for any acute angle: Take any length on the blade as radius; then the length on the tongue will equal the tangent of the required angle. The accompanying diagram illustrates the principle.

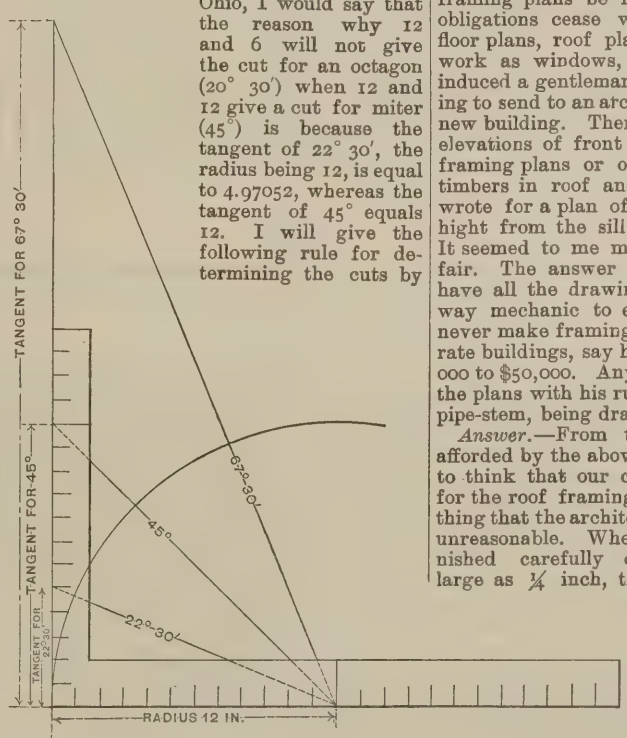


*Diagram Accompanying Letter from C. J.*

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### Construction of Valleys.

*From* L. A. R., *Corning, N. Y.*—In the issue of the *Carpentry and Building* for November the question was asked by "J. W.," of Woonsocket, R. I., Which is the best way to construct a gutter that forms the angle between two roofs? In reply I would say use a long piece of tin by all means in preference to attempting to make a tight joint by shingling. Use a piece of tin 14 or 16 inches wide, as the case may be, and place it so as to leave a water space in the center of about 3 inches at the top and 4 inches at the bottom. These dimensions are relative, because the width of the space depends in some measure on the size of the roof. Do not nail in closer to the water space than is necessary in fastening the shingles. A valley gutter of this kind, if kept well painted, will last for a long time.

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*From* L., *Cottage City, Mass.*—In answer to "J. M.," of Woonsocket, I would advise him never to run tin or copper the entire length of a valley, but instead to use zinc in pieces 9 inches square. Bend from opposite corners, and at every course of shingles put in the zinc, holding the piece in place by a nail at the top. Lap the shingles one over the other. By this construction a tight valley is produced by what I think is the only proper method.

*Note.*—The plan suggested by this correspondent is in very common use in certain sections of the country, and we know that it gives good satisfaction. We suggest, however, that better results would be obtained by substituting some other metal for the zinc. Unless the zinc is of much thicker gauge than is ordinarily employed it would be apt to give out before the roof in other parts would show any sign of decay. Zinc is only cheap when it is used of very light gauges—too light, in fact, for the purpose. We suggest the employment of a good quality of roofing tin where this construction is followed, thoroughly painted before being laid.

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### Architects' Drawings.

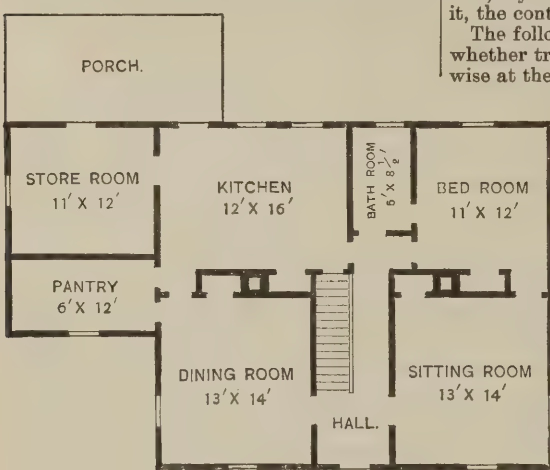
*From* F. C. C., *Washington.*—When an architect is engaged to furnish plans and details of a house to be built of wood—in other words, a frame house—should the framing plans be included, or would his obligations cease when he had furnished floor plans, roof plans, and details of such work as windows, doors, porch, &c.? I induced a gentleman for whom I am working to send to an architect for the plans for a new building. There came the floor plans, elevations of front side and rear, but no framing plans or other indications of the timbers in roof and sides. Accordingly I wrote for a plan of the roof and asked the hight from the sill to the top of the plate. It seemed to me my question was entirely fair. The answer was as follows: "You have all the drawings to enable any halfway mechanic to execute the work. We never make framing plans except in elaborate buildings, say houses costing from $30,000 to $50,000. Any carpenter can measure the plans with his rule. All is as plain as a pipe-stem, being drawn ¼ inch to the foot."

*Answer.*—From the meager particulars afforded by the above letter we are disposed to think that our correspondent in asking for the roof framing plan demanded something that the architect had cause to consider unreasonable. Where elevations are furnished carefully drawn to a scale as large as ¼ inch, there would seem to be no difficulty in determining such points as our correspondent mentions. In fact, most carpenters would prefer to arrange their framing to suit themselves, instead of being obliged to follow the arbitrary lines of some inexperienced draftsman, who, in most cases in doing the work, would have more consideration for the general appearance of the drawing than the best construction possible with the kind of materials to be used. It would seem from our correspondent's statements that he desired to escape the responsibility of working out the framing of the building in question, either from inability to do such work or from the labor involved. We think in most cases an architect considers his commission for an ordinary dwelling entirely filled when he supplies elevations, floor plans and a few details, with perhaps some sections necessary

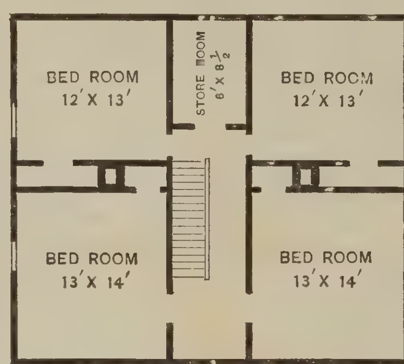
to fully illustrate the work. Those instances where framing plans are supplied occur with architects who have entered the profession from the work-bench rather than from the drafting-table, and framing plans are very frequently found where other desirable portions are omitted, indicating at once that so-called architects are not always equally well posted in every department of their work. Where elegance of design is considered construction is sometimes deficient, and where constructive features are prominently displayed design is sometimes sacrificed. In this connection it should be remarked that some architects will show twice as much with the same number of lines as others. We have before now examined elevations drawn to as small a scale as ⅛ inch to the foot that really conveyed more information concerning the proposed edifice than other sets of drawings made to double the scale and accompanied by elaborate details.

### Arrangement of Rooms.

*From* F. C. P., *Philadelphia.*—I inclose some floor plans prepared in answer to the question submitted by "J. H. W.," in the November number of *Carpentry and Building*. They fulfill his requirements as nearly as possible. In his specification he demands more than can be accomplished. He wants dining-room, sitting-room and bathroom to connect with hall, the dining and sitting rooms to connect with each other, and each to connect with the bedroom, and the bedroom to connect with the bathroom. The plans submitted are as near as I can get to these extraordinary conditions, the only difference being that the dining-room does not connect with the sitting-room or bedroom except through the hall. The plan represents a house of moderate cost, say one and one-half stories in hight. Windows, verandas, &c., are to be arranged as desired.




First Floor.




Second Floor.

*Arrangement of Rooms Suggested by F. C. P.*

### Hardwood Finish.

*From* L. A. R., *Corning, N. Y.*—In reference to the matter mentioned by "G. S.," of North Adams, Mass., I think—in fact, I am quite positive—that he is mistaken and that his carpenter friends are right. My experience has been always to use sandpaper after the scraper, and to avoid using coarse sandpaper. I should use No. 1 or 1½, and never crossways of the grain. That would leave scratches, which would be likely to show through an ordinary finish.

### Castles of Ireland.

*From* A. V. S., *Little Rock, Ark.*—In the November number of *Carpentry and Building* "G. S. P.," of Brooklyn, inquires for books descriptive of the baronial castles of Ireland. I remember reading some years ago a number of Hall's "Ireland," which was rich in illustrations and description of Ireland, including old castles and ruins. In many instances it gave the history and legends of these buildings. The work referred to was in three volumes and was quite elaborate. I do not remember the exact title nor where it was published, but with this hint and the aid of some English catalogue—for instance, like one that the American News Co. publish annually—I think the correspondent may find the book referred to.

### Measuring Tapering Timber.

*From* C. E. D. A., *Hudson, N. Y.*—The rules for measuring tapering sticks of timber are varied and numerous. Experiments will produce curious results, of which the following is one: Given, a stick of timber 12 feet long, 6 x 6 inches at one end and 18 x 18 at the other; required, to find its contents in board measure. The operation is as follows:

6 = size of small end.
12 = the side of the middle section.
18 = the side of large end.
—
36 = sum of the sides.

Square 36, which gives 1296. Divide this by 12, which gives 108, or what may be considered the area of the average end. Add to this the area of the small and the large ends—that is, $108 + 36 + 324 = 468$. Multiply this by one-third of the length, 4, which gives 1872. Divide this by 12, which gives 156 feet board measure, the answer. This rule, it should be observed, will not work in all similar cases.

Another rule is to cube the length of the long corner. This, like the one above given, is shaky. To prove the correctness of any rule, try to measure sticks of other size by it, the contents of which are already known.

The following rule applies to all frustums, whether triangular, square, round or otherwise at their two bases.

Rule: The contents of a stick of tapering timber are equal to three pointed sticks, each having the length of the given stick and areas of end equal to the small and large ends and mean proportional respectively. Example: A stick of timber 6 x 6 and 18 x 18 on the ends, and 12 feet long, is measured as follows: $6 \times 6 = 36$, area of small end; $18 \times 18 = 324$, area of large end; $324 \times 36 = 11,664$. The square root of this product is 108, which is the mean proportional. Then the three pointed sticks figure as follows:

A, 36 × 12 feet long, 144, inch feet.
B, 324 × 12 feet long, 296, inch feet.
C, 108 × 12 feet long, 432, inch feet.
12 in. | 1872, inch feet.
156 board feet.

The above calculations are made the same as in the case of pyramids, namely, the base is multiplied by the hight, and one-third of the product taken.

*Note.*—The first rule given by our correspondent above is an excellent example of the plausibility of certain rules which rest upon very inadequate foundations. It is, as our correspondent informs us, sent more as a curiosity than for any other reason.

*From* G. A. H., *Parkman, Ohio.*—In the November number of *Carpentry and Building* I notice a solution of the tapering timber problem from "G. J.," of Trenton, N. J. This correspondent seems to think his method the best yet presented. The method is right enough, but his calculations are nearly all wrong. The six boards, 6 x 18 inches, 12 feet long, making 72 feet board measure, are right, but the rest of the calculations are all wrong. The first two boards, which he makes 21 feet 8 inches, I make 21⅔ feet, or 21 feet 96 inches. In his calculations he probably called $\frac{8}{12}$ foot 8 inches instead of 96 inches. It would seem that he was calculating 12 inches to the foot instead of 144. There are 24 pyramids 1 inch base by 24 inches high, which "G. J." makes to contain 2 inches each, when in fact they contain 8 inches each. I will give the analysis and calculations as I make them:

| | Feet. |
|---|---|
| $6 \times 12 =$ | 72 |
| $8 + 18 \times 10 \div 12 =$ | 21⅔ |
| $10 + 18 \times 8 \div 12 =$ | 18⅔ |
| $12 + 18 \times 6 \div 12 =$ | 15 |
| $14 + 18 \times 4 \div 12 =$ | 10⅔ |
| $16 + 18 \times 2 \div 12 =$ | 5⅔ |
| WEDGES. | |
| $6 + 6 \div 12 =$ | 1 |
| $8 + 8 \div 12 =$ | 1⅓ |
| $10 + 10 \div 12 =$ | 1⅔ |
| $12 + 12 \div 12 =$ | 2 |
| $14 + 14 \div 12 =$ | 2⅓ |
| $16 + 16 \div 12 =$ | 2⅔ |
| 24 pyramids, each 1 inch base by 24 inches long, making 24 square inches base: | |
| $24 \times 8 \div 144 =$ | 1⅓ |
| Total | 156 |

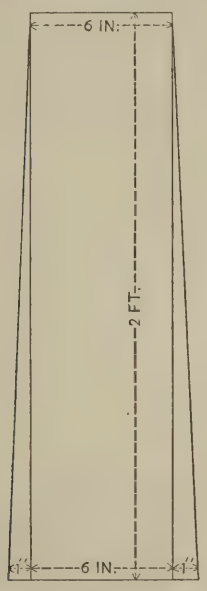
*From* H. W., *Burton, Ohio.*—"G. J.," in his solution of the tapering timber problem given in the November number, made an error in computing the contents of his tapering pieces. The principle used by him is for timber tapering only one way, but will not work where tapering both ways, as will be readily seen by the following: Take the two pieces, 1 x 8 inches at base, 6 inches at point and 2 feet long. Taking a board from each 6 inches wide we have one board containing 1 square foot, leaving four pyramids 1 inch at base and 2 feet high. Find contents of these by multiplying area of base, 1 inch, by one-third of hight, 8 inches; we have 8 square inches in one, or 32 square inches in the four, giving 1 square foot and 32 square inches as contents of the two pieces, instead of 1 square foot and 24 square inches, as given by "G. J.," a difference of 8 square inches. As the taper of the timber is the same, the same difference will occur in each of the six sections of tapering pieces, making 48 square inches in all.

I will give my solution of the whole, which is at least mathematical, if not practical. The square root of the product of the areas of the two ends gives 108 square inches, the mean area. The sum of the three areas, $324 + 108 + 36$, multiplied by one-third its length, 4 feet, gives $\frac{1872}{12}$ square feet, or 156 square feet.

*From* F. W. B., *Hoosick Falls, N. Y.*—I see in the November number that another correspondent has measured "J. W. J.'s" stick of timber and obtained a verdict different from any of the five already given. In the first place, he divides the stick into 16 pieces, which are trapezoids, and 12 wedges, or "tapering pieces." Then he measures the trapezoids, and correctly. By the time he has this done any one of the correspondents who obtained the correct result has measured the whole stick, and he has yet 12 pieces to measure, any one of which is as difficult to measure as the original stick. He undertakes to make one trapezoid out of two wedges, and he makes about the same mistake the purchaser of the stick did in contending it contained only 144 feet. If he will save the lumber he loses when he turns that one wedge "end for end," and applies it to the other and calls the two a trapezoid, he will not require any from either "J. H. M." or "P. W. W." For example, if he will take the two "tapering pieces" he has at the large end of the stick and put them together, he will have a wedge which has a base 2 x 18 inches, an edge 16 inches and an altitude 2 feet. Now, let him, in his "practi-

cal way," take a "tapering piece" from each end of this wedge, making it of a uniform width, 16 inches, and put these two pieces together, and he will have a pyramid 2 inches square at the base and 2 feet in hight, and a wedge 2 x 16 at the base and 2 feet in hight. The wedge is equivalent to a board 16 inches wide and 2 feet long, and contains 2 feet 8 inches, and the pyramid contains 2⅔ inches, making 2 feet 10⅔ inches in two pieces, instead of 2 feet 10 inches. The 12 tapering pieces contain 12 feet 4 inches, instead of 12 feet, as he makes it.

*From* W. R., *Verona, Pa.*—Your correspondent, "G. J.," of Trenton, N. J., whose communication appeared in the November




*Measuring Tapering Timber.—Diagram by W. R.*

number of *Carpentry and Building*, makes his error in the measurement of the tapering piece. He fails to observe that they taper in two directions. The following figures should be substituted for the calculation of the tapering pieces in the latter part of his communication :

$$6 \times 2 + \tfrac{1}{3} \times 2 \times 4$$
$$8 \times 2 + \tfrac{1}{3} \times 2 \times 4$$
$$10 \times 2 + \tfrac{1}{3} \times 2 \times 4$$
$$12 \times 2 + \tfrac{1}{3} \times 2 \times 4$$
$$14 \times 2 + \tfrac{1}{3} \times 2 \times 4$$
$$16 \times 2 + \tfrac{1}{3} \times 2 \times 4$$

For example, take the top piece in the diagram submitted and divide it, as explained, into three pieces, namely, a rectangular solid and two pyramids. The contents of the rectangular solid would be $\frac{6 \times 2}{2}$. The contents of a pyramid are equal to the area of its base multiplied by one-third of its altitude. Since there are two of these pieces, we will have two rectangles and four pyramids. Combining these elements to show the contents of both pieces, we have the following: $6 \times 2 + \frac{1}{3}(2 \times 4) = 1.02\frac{2}{3}$. The other calculations are made in the same general manner as indicated in the figures above.

### Ownership of Plans.

*From* S., *Oneida, N. Y.*—I have been a subscriber to *Carpentry and Building* from the first number to the present time. I believe that thus far nothing has been published in that paper relating to the following: We often read in an architect's specifications that "the plans are the property of the architect and must be returned to him on completion of the work." No doubt many of your readers would like to know whether this is so, and by what right the architect retains plans after the client has paid him for the same. Is there any statute law bearing on this point in any of the States? if not, by what reason does this occur? Could a claim of this kind be enforced by an architect in a court of justice?

*Note.*—The subject suggested by our correspondent is one that is of interest to every builder as well as sub-contractor who has to do with architects' drawings and specifications. Instead of attempting a definite answer to our correspondent's question we are disposed to refer it to our readers for such discussion as they may see fit to give it. We do this in order that the builder's side of the question may be made apparent. In passing we may say that we are of the opinion that no injustice is done to any one by this position of the architect. He sells his professional services rather than a set of drawings as so much merchandise. The drawings are the medium by which his services are made available, and, morally, if not legally, he certainly has the right to prevent further use being made of his ideas than that for which he has been paid. This is not by any means an adequate reply to our correspondent's question. We desire to have the views of builders generally upon it.

### Books on Estimating.

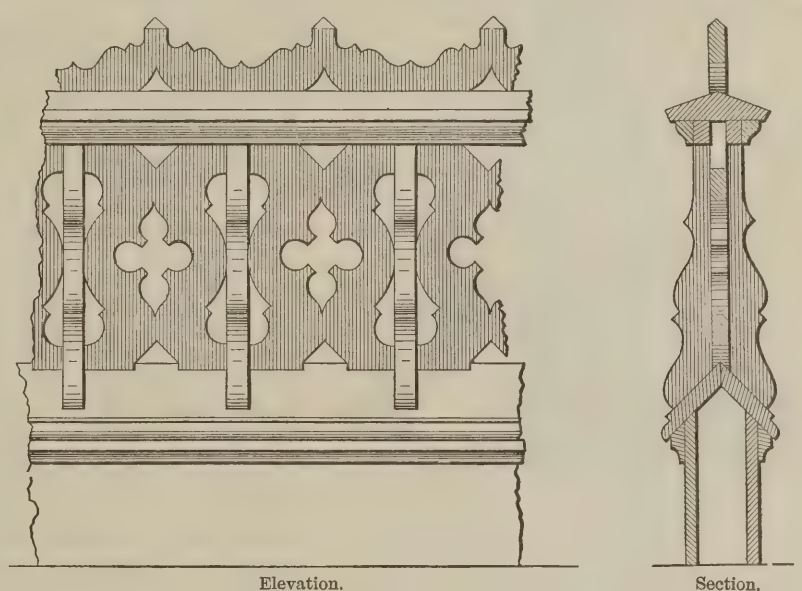
*From* T. B. G., *Springfield, Mass.*—I want something that will assist me in figuring up the cost of a building upon surface measurements or upon any other system, without going into detail, to save time.

*Answer.*—This correspondent's request is not unlike others that we have received in the past. Something is demanded by which to determine the cost of a building without the necessity of going into detail. What is wanted, apparently, is ready-made figures. The fact that builders and contractors generally are so eager to escape the work of detailed estimates accounts in some measure for the frequent losses that occur in this line of business, and for the absence of profits which is a prominent characteristic wherever the building trade is considered. We do not know of any such book as our correspondent names, and we must urge him and urge others who are similarly situated to give up expecting to find any other assistance in their estimates than that which comes from long practice and the most painstaking care.

With reference to books on estimating, there are several helps which are entitled to mention in this connection. The "Handy Estimate Blanks," which have already been noticed in these columns, afford a convenient basis for recording the items that compose a given structure, for pricing and for extensions. The "Practical Estimator," the companion volume, contains many hints with reference to estimates and directions for the use of these blanks. Vodge's "Architect and Builder's Companion" contains a great deal of information that is useful to those making estimates, as does also the "Builder's Guide and Estimator's Price Book," by Hodgson. This work in some respects approximates what our correspondent asks for, inasmuch as prices are in many cases indicated, With the frequent fluctuation in the markets, however, of materials in general, it is necessary to warn our correspondents not to place unqualified dependence upon it. Kidder's "Architect and Builder's Pocket Book," a recent work, contains a vast fund of information that should be thoroughly digested by builders and estimators in general, especially those who give attention to the better class of buildings. It is of a character, however, to be of little use to any one who desires ready-made figures. Brown's "Building Tables and Estimate Book" is also a useful adjunct. It contains a number of useful tables, embracing, among others, bills of timber for different size buildings, tables of studding, joists, square timbers and rafters, &c. The royal road to estimating, as we have pointed out in the past, is a thorough knowledge for construction in every particular, thorough familiarity with drawings, a knowledge of the value of materials, a practical acquaintance with what average workmen can accomplish, and painstaking labor in analyzing and listing the various elements that enter into the construction of a building.

### Fences.

*From* H. M. G., *Waltham, Mass.*—In reply to the inquiry of "J. T. T." for a design for an ornamental fence, I inclose a sketch of one which has long been a favorite of mine, and which I trust will meet his approval.




*Design of Ornamental Fence Contributed by H. M. G.*

## REFERRED TO OUR READERS.

### Staining White Brick.

*From* A. M., *Wingham, Ont.*—I would like to learn, through *Carpentry and Building*, what will make the best water-color stain for staining white brick red. Something is desired which will stand the weather and which will not readily rub off.

### Back Plastering.

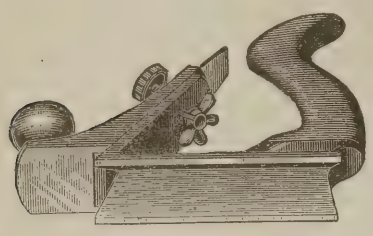
*From* J. C. W., *St. Paul, Minn.*—I desire to learn, through *Carpentry and Building*, the opinions of practical men with reference to cross-lathing as compared with up-and-down lathing for back plastering. Which is the best for the purpose?

Mr. E. M. Bell, the supervising architect, in his annual report to the Secretary of the Treasury says there are now in course of construction 80 new buildings, ranging in cost from $25,000 to $2,000,000 each, calling for a total expenditure of $8,511,400. The expenditures for the year on this account have aggregated $2,438,709 The architect suggests that immediate steps be taken for the purchase of a site and the construction of a fire-proof and convenient building for the appraiser's stores.

# NOVELTIES.

### Improvements in Planes.

The Stanley Rule and Level Co. have recently brought out several new specialties that are of interest to our readers. Four of these are shown in the accompanying illustrations. Scarcely more than a glance at



*Novelties.—Fig. 1.—Adjustable Chamfer Plane.*

them is necessary for the mechanic in order to comprehend their use. Fig. 1 represents a chamfer plane in which the cutter is attached to a section of the plane that is adjustable up and down. It is so arranged as to be firmly secured to the rear section at any desired point by means of a thumb-screw. The makers state that without the use of any other tool this plane will do perfect chamfer and stop-chamfer work up to 1½ inches in width. When the two sections are clamped together, so as to form an even base line, the tool can be used as an ordinary bench plane. Fig. 2 represents a rebate plane with an iron stock and depth

*Fig. 2.—Rebate Plane with Iron Stock and Depth Gauge.*

gauge. The tool is so constructed that when the depth gauge is off the plane will be perfectly flat on either side, and can be used with either right or left hand equally well. This makes this tool particularly useful for planing into corners or up against perpendicular surfaces. Three widths are manufactured, namely 1, 1¼ and 1½ inch. Fig. 3 represents a tool that is not strictly a carpenter's tool. It is useful in cabinet-work,

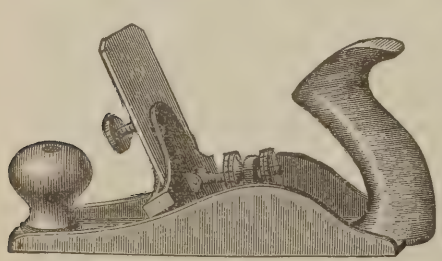


*Fig. 3.—Scraping and Finishing Plane.*

for scraping and finishing hardwoods and veneers. The features of the tool are clearly shown in the engraving, so that a description is scarcely necessary. By inserting a toothed plane iron, properly prepared, in place of the scraper iron, a smooth surface can be corrugated uniformly, and thus made ready for glueing. The fourth illustration represents a floor plane. The planing of floors, which is very commonly required in modern work, involves perhaps more backache and hard knee service than any other work required of carpenters. The tool here illustrated has been devised to relieve the mechanic in this respect. The length of the plane is 10½ inches, the width of the cutter is 2⅝ inches, and the plane is heavy, weighing about 10 pounds. The handle is 45 inches long, and the two grips can be adjusted to suit the requirements of the individual operator. For planing floors for such purposes as bowling alleys, skating rinks, decks of vessels, &c., this tool will be found very useful. The makers assert that more work can be done with it, and with less outlay of strength, than with any other article now in the market. These tools are manufactured by the Stanley Rule and Level Co., New Britain, Conn., and New York office at No. 29 Chambers

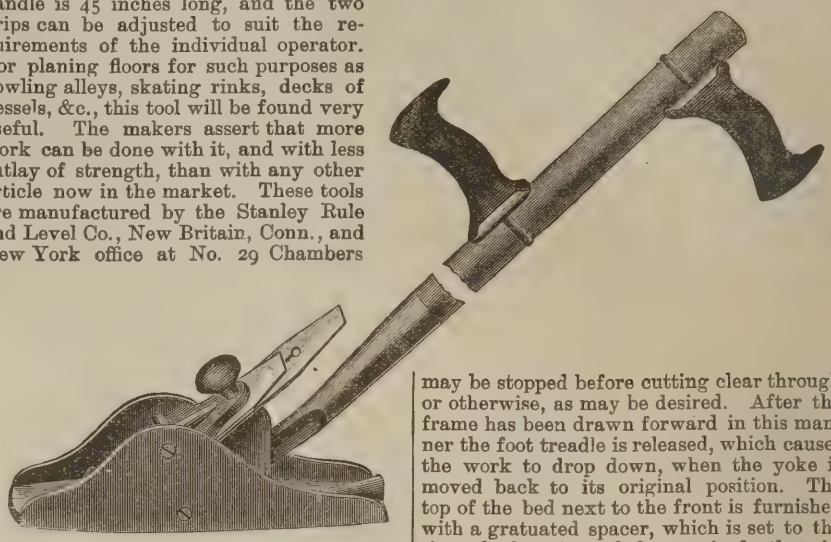


*Fig. 4.—Floor Plane.*

street. They are just being introduced, and will no doubt soon be found in the stores of hardware dealers generally.

### Dadoing Machine.

At the fair of the American Institute in this city, which closed early in December, J. K. Benway, of Albany, N. Y., exhibited a dadoing machine which contains features of particular interest for cabinet-makers and other workers in wood. A general view of the machine, with the peculiar construction of counter-shaft necessary to its operation, is shown in Fig. 5. The machine in its various parts is extremely simple, and in most respects would be understood by practical wood-workers by inspection of the engraving without a description. On the top of the machine is a traveling frame working in guides at right angles to the front. This frame carries the arbor and cutter-head, and has an adjustable rod connecting it with the counter-shaft above, which tilts as the yoke travels back and forth, thus keeping the belt to the proper tension. The cutting-head consists of two fine saws, some 5 inches in diameter, with all the teeth in each flaring outward except three on each side, which are filed straight across. The center one of each three is slightly set inward, thus cleaning the joint made by the cutter. Two studs are fastened into the stationary collar, passing freely through the saws and loose collar, and to these the blades are secured. There are four blades on each sides. By alternately placing and removing these blades 16 cuts can be made varying from $\frac{3}{16}$ inch to 1⅛ inches in width, or, if wider cuts are desired, they may be made by inserting another set of thicker plates. The blades are placed so that the joints do not range with those opposite. By this plan the bottom of the cut is made perfectly clean. The depth of the cut is regulated by raising or lowering the traveling yoke and frame already referred to. This is done by means of the crank-wheel shown at the front in the engraving. Thickness of material is accommodated by raising or lowering the bed, which has a movement of 5 inches. The bed is controlled by the crank-wheel shown at the right. The bed is set so as to allow the piece to be treated to pass through freely. When it has been put in proper position the foot is applied to the treadle shown at the front, which causes the bed to rise still further, thus clamping the work tightly to the cross-rails. This method of treating the work has the good effect of straightening it out in case it should be warped before the cuts are made. When the work is in this position the traveling frame is quickly drawn forward by the hand of the operator until it rests against a clamp or stop that is fastened at the proper point. This stop serves to regulate the length of the cut, so that it may be stopped before cutting clear through or otherwise, as may be desired. After the frame has been drawn forward in this manner the foot treadle is released, which causes the work to drop down, when the yoke is moved back to its original position. The top of the bed next to the front is furnished with a gratuated spacer, which is set to the size of the pigeon-hole required—that is, supposing that work of this kind is being made. The work is then moved to the left until the stop on the spacer drops into the cut first made, when the operation is repeated. This is continued until all the required cuts have been made to complete the pattern. The operations above

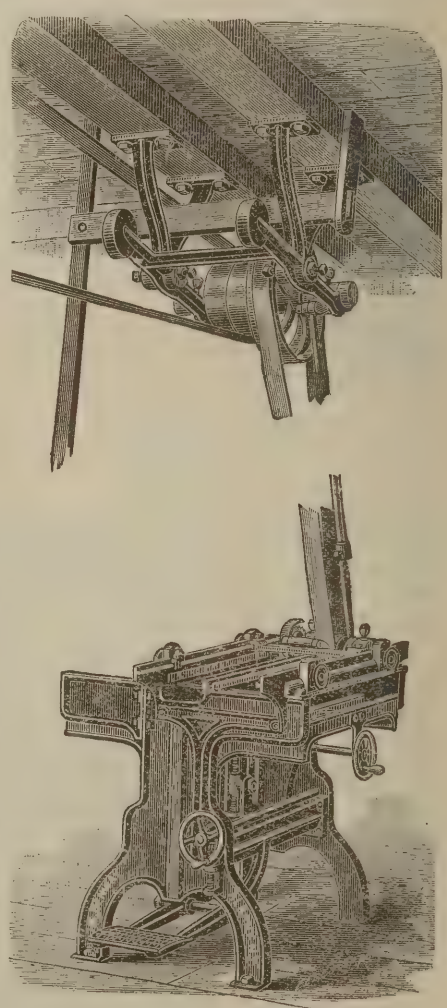
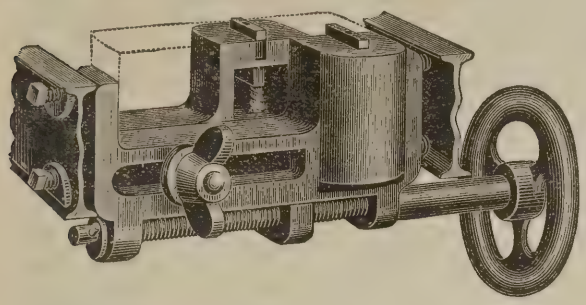


*Fig. 5.—Benway's Dadoing Machine.*

mentioned are more quickly performed than described. A special attachment is used on the machine for duplicating. The appearance of this will be gained from an examination of Fig. 6. The spacer already referred to is removed and a piece that has been dadoed is passed into the machine with the cut side down, and is moved until the first cut reaches the duplicator. The engraving of this attachment shows it ad-

justed between the two center beams of the bed. The right-hand stop is stationary and in line with the side collar connecting the head. The other stop is adjustable and moves from right to left by use of the hand-wheel until the full width of cut that is being made is reached. The pattern now being held by the duplicator, a tack or small spur is driven into it to prevent the next piece, which is placed upon it, from slipping, when the same operation as already described takes place. By this



*Novelties.—Fig. 6.—Duplicator Used on Benway's Dadoing Machine.*

provision each cut is made to come directly opposite the one on the other side; hence all the pieces made are exact duplicates of the first. If variations in spaces have been made in the first, corresponding variations will by these means be secured in the duplicates. With reference to the rapidity with which work can be done with this machine, the maker asserts that by it from 1500 to 2000 pigeon-holes can be made in a day, the mere laying out of which by hand

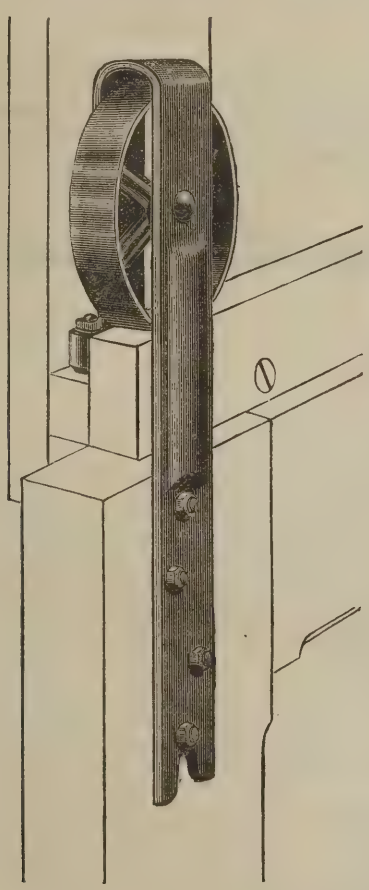


*Fig. 7.—Stearns's Patent Wrought-Iron Door-Hanger.*

would be quite expensive. The method of duplicating above described applies to various other kind of work, such as gaining out stepladders, window-frames, door-jambs, stair-stringers, &c., and grooves at any angle can be made. By removing the dado-cutters and inserting a fine cut of saw, the machine can be used for mitering or cutting up material for drawers and similar work where extreme accuracy is desired. The collars used with the dado-head are provided with heads in which may be secured various cutters for molding panels and other similar work at any angle required. Molding around square posts, sometimes called "square turning," can bed one by the same means.

### Stearns's Patent Wrought-Iron Barn-Door Hanger.

The accompanying illustration, Fig. 7, represents an article which is made by E. C. Stearns & Co., Syracuse, N. Y. It will be recognized as embodying the principles of another hanger of their make, different from it, however, in that it is made of wrought iron and of a somewhat different pattern. The makers in describing this article say it is so constructed as to give the greatest strength for the weight of metal used. The bearings are chilled and the wheels are turned and finished perfectly true. Accordingly the door will run with ease. The small roller shown in the cut is to prevent any side friction. The makers state further that they have endeavored to overcome the common objection to barn-door hangers running on a wood track, namely, the difficulty of obtaining well-seasoned lumber, by keeping in stock a supply of appropriate sizes and kinds. The track is sent out furnished with iron brackets for putting up. This Hanger is made in 4 and 5 inch sizes.

### A New Foot-Power Mortising and Tenoning Machine.

Figs. 8 and 9 show details and general view of a new mortising and tenoning machine combined, designed and built by Louis F. Parks, 272 Colerain av., Cincinnati, O. The machine may be set upon any work-bench, occupying but very little space, and is adapted for any ordinary work. Its special advantages are the readiness with which the mortising or tenoning tools can be adjusted to cut different widths and thicknesses of stuff. To adjust tools for different widths of stuff it is only necssary to loosen the thumb-screw C at the back of the iron frame, which permits the mandrel to be raised or lowered to any desired hight. It is held firmly in its proper position by simply reversing the motion of the thumb-screw until tight, while to adjust tools for different thicknesses of stuff the wheel D turned from right to left, or *vice versa*, moves the guide-plate to the required position. The knives can be set to various angles, if necessary, by loosening the thumb-screw C and tilting the mandrel sideways. The latter is reversed by means of the handle or lever F, the tension of the large steel coiled spring forcing it into small notches cut or cast into each side of the sleeve bearing above it and hold-

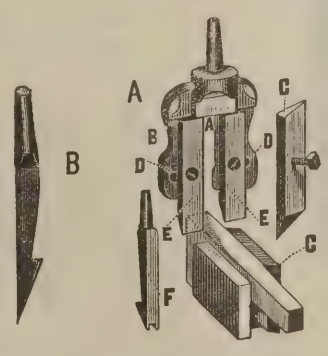



*Fig. 8.—Details of Foot-Power Mortising and Tenoning Machine.*

ing it firmly in place. The tools are bolted to a yoked body-piece, as shown in the illustration, having stamped on its outward face a scale or series of gauge marks. To cut different thicknesses a shoulder is cut in the upper portion of yoke-

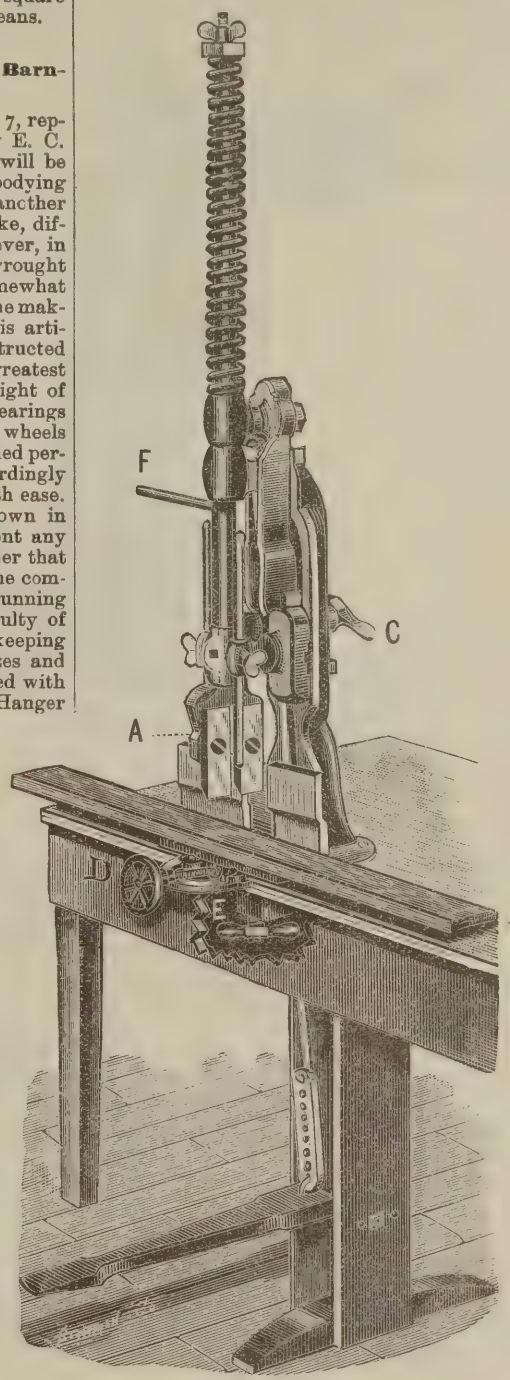


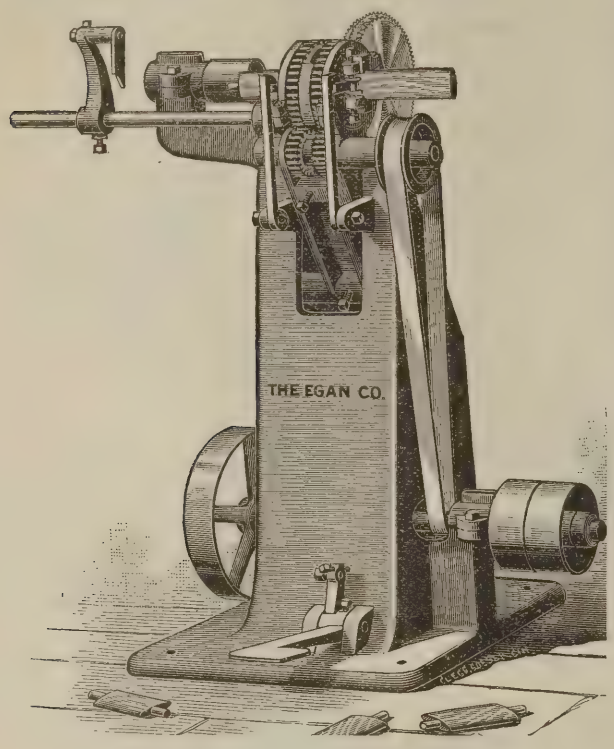

*Fig. 9.—New Foot-Power Mortising and Tenoning Machine.*

piece, against which the blunt ends of the tools are squared. All parts are adjusted from the front and so made as to not readily get out of order. Bevel chisels specially adapted for sashwork, blind-slat chisels, or any form of tool required for work to be done with this machine, may be used, and by the use of which the manufacturer claims work can be turned out cheaper and much more conveniently than by other methods.

### Blind-Slat Tenoner.

Many new points of advantage are claimed by the Egan Co. for their new blind-slat tenoner, a general view of which is presented in Fig. 10. The frame of this machine is a pedestal well designed and cored out, making it stiff and durable. The frame is cut on one side so that no dust nor chips are liable to lodge in it. Jaws are so arranged as to be instantly adjusted on both sides by one screw having a right and left hand thread. By this means speed and accuracy are combined, and the manufacturers claim that the jaws can be set much quicker and much more accurately than by any other

method in use. The treadle is convenient to the operator, and slightly pressing with the foot brings the head with its slat forward. One revolution is made when a stop is struck. A complete blind slat with tenon on two ends is made by a single revolution.




*Novelties.—Fig. 10.—Blind-Slat Tenoner.*

In length a slat can be cut on this machine from 1 inch up, as required. The gauge will admit of any length, and the stops can be instantly changed so as to gauge accurately wherever required. A special feature to which the makers direct attention in this machine is that when the treadle is released from the foot the feed belt is loose, and when the foot is on the treadle the feed-belt is tight. The makers recommend this tool for use in planing mills, car shops and in all other places where a first-class machine is required. They claim that with it a boy can do work more rapidly and more accurately than an expert on machines ordinarily employed.

### New Flat Key Mortise Lock.

The Eagle Lock Co., Terryville, Conn., and 98 Chambers street, New York, have recently placed on the market a new lock, which we illustrate in Fig. 11. The principal feature of this drawer or cupboard lock is that the key-guide is made adjustable to drawers from 1 to 1½ inches thick. The key-guide, instead of being of one piece with the lock, is fastened to the escutcheon plate, as shown in the cut, Fig. 12. This key-guide consists of a rod provided with a longitudinal groove through which the key is passed. The guide passes through the lock and projects beyond, according to the thickness of the drawer. The key is adjusted to the lock by the bit, meeting the casing at the back of the lock, while the shank passes through in the guide. Another feature of this lock to which the manufacturers call attention is the manner of fastening the lock casing to the face-plate, so that the former always hangs vertically. As the key-guide when passed through the lock is at right angles to the casing, it is obvious that if the lock casing and face-place were secured rigidly together the former would have to be adjusted very finely to its mortise. But, the casing being suspended from the face-plate by two rivets or lugs, it can swing slightly either way, and so adjust itself to any imperfections in the mortise. The manufacturers allude to these features of construction as facilitating the work of setting the lock.

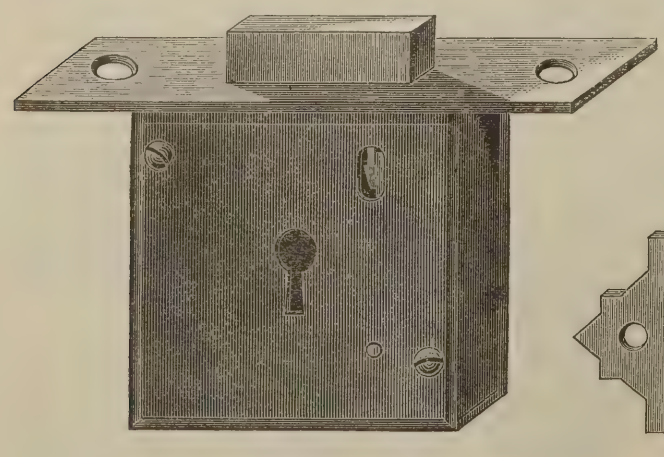


*Fig. 11.—New Flat Key Mortise Lock.*

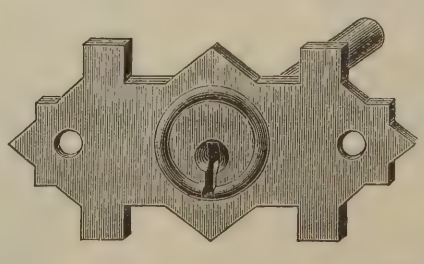


*Fig. 12.—Key-Guide.*

### Combination Gauge.

We show in Fig. 13 a combination gauge that has recently been put upon the market by Otis A. Smith, of Rockfall, Conn. It may be described as a 20-inch panel and marking gauge, the first term indicating its capacity and the latter term the uses to which it may be applied. The gauge is of metal, the bar being of hollow tubing, the sections joined by a threaded portion, as indicated in the center of the engraving. In the specimen which has been submitted for our inspection the joint is very neatly made, insuring the free passage of the cross-arm. Should a longer gauge for any reason be required, the tool could be lengthened by using additional sections of tubing combined in the same manner. The gauge being made of metal, as we have described, is likely to be far more durable than wooden gauges which it is intended to supersede, and at the same time it is lighter than wooden gauges. The sections of which it is composed are approximately 10 inches in length, and the gauge when taken apart packs up in a very small compass. Among the advantages to which the maker directs attention is that, the bar being round, the gauge can be set in any position necessary for making either a deep or shallow cut with the spur. The spur is adjustable by means of screws entering the end of the rod. Provision is also made at one end of the bar for inserting a pencil for marking parallels or for inscribing circles. At the opposite end of the bar a small marking gauge may be attached, thus adapting the gauge to mark two widths without the necessity of alteration. This supplementary gauge is attached by a thread on the collar shown at the right. The supplementary gauge consists of a solid bar of steel, the projection of which from the tube is controlled by a set-screw. In the end of the rod of this supplementary gauge a spur is inserted which is held by a set-screw and may be adjusted the same as the spur in the main guage already described. The small tool becomes a very convenient adjunct for use in narrow and confined spaces. It is also provided with a second spur on the inner end, differing from the one on the outer end, as shown in the cut, by being placed as close as possible to the end of the rod, in order to mark near ledges, in rebates, &c. When it is required to use this spur, which is driven tightly in place, the adjustable spur in the opposite end is removed and the rod reversed, which is quickly accomplished. In addition to the advantages above recited, this gauge, by being divisable in the middle, affords both a long gauge and also a comparatively short one, thus giving the mechanic the opportunity to use it in that form which is best for the particular work he is doing.

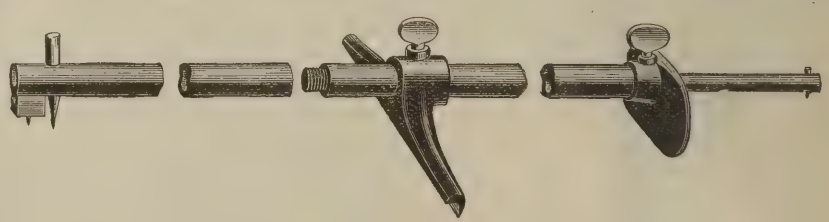


*Fig. 13.—Fale's Combination Gauge.*

### Mahogany.

Five years since, it is asserted, the imports of mahogany to this country amounted to only 500,000 feet annually. At present the volume of trade in this material is not less than 10,000,000 feet annually. A comparison of the figures will indicate the rapid growth of this wood in popularity. A short time since it was considered an expensive wood, but with the increased consumption its cost has been reduced, so that at present it is not much dearer than native walnut or cherry. Mahogany is not only fashionable wood, but it is the most reliable wood known to commerce. It is unequaled for doors, house-trimming, furniture, or for any purpose where a hardwood is desired. It does not warp nor check; neither does the sun fade it, but, on the contrary, it brings out its rich color. Time, which destroys other woods, only serves to increase the value of mahogany. An incident of its introduction into England early in the eighteenth century is worth relating. A West Indian captain brought a few planks to his brother, Dr. Gibbons, of London, who was erecting a house on King street, Covent Garden. The doctor knew something of wood, and instructed his master workman to use the planks in some of the interior work of his house. The workman said they were too hard, but the good doctor, having a cabinet-maker named Wallaston, turned to him and half-jokingly asked if he could not make a candle box to adorn his library. The cabinet-maker, like some others of his craft, knew no such word as fail, and accordingly essayed the task. As the result of his skillful labor he brought the

doctor a box, the finish of which outshone all the other furniture. The fame of it grew, and, as a result, the permanence of mahogany as a fashionable wood was secured. Mahogany is found in the West India Islands, and also in Mexico. Some time between the years 1521 and 1540 Cortes and his companions, after their conquest of that country, used it in the building of the ships in which they sailed on their voyages of discovery. The color of mahogany when freshly cut is of a light tone, and in finishing it this shade should be preserved. The finisher should not be permitted to use any stain upon the wood, as this detracts from its effect and interferes with one of the most beautiful operations of nature. The owner of a house finished in mahogany may notice from month to month the deepening shades of color in the wood, which mellow in the sun's rays, and take on a richer glow. This increases year after year, until the wood is resplendent in beauty. To stain such wood is a vain attempt to improve upon nature, and by it the changes in shade and variety in tones of color are destroyed. Mahogany is unsurpassed as a cabinet wood, and has long been used by the Govern ment in fitting up public buildings.

## King-Posts.

One great *desideratum* in scientific carpentry is that every timber shall be subject to the particular strain for which it is designed. This, especially in roofs, is far from being so simple a matter as might be imagined at first sight. A little inaccuracy in cutting shoulders and tenons is very apt to throw a pressure upon one single point in a surface over the whole of which it is intended to fall. This, in the case of struts or brackets, is very liable to cause fracture by splitting, and with a king-post it is a fruitful source of danger if the angle of the struts is slightly altered in tightening up the king-bolt. We depend upon the yielding power of the fibers of the wood in such a case, but it renders a respectable margin of strength desirable. In the mediæval roofs, whose forms have often been repeated, both in modern churches and in works of restoration, the original builders appear to have had no very clear notion of the special function of each piece of timber. A tie-beam was seldom introduced, the horizontal thrust of the rafters being overcome by means of thick walls and massive buttresses, so that most portions of the truss were in compression. A collar tenoned into the rafters and secured with oak pins may have been intended to act as a tie, but it has often been found on inspection to have been in compression. The larger scantling of the rafters being turned sideways, and the timber used being oak, there has been a tendency in the rafters to sag and compress the collar. In such a case the king-post has rested upon the collar, and simply assisted in holding up the heads of the rafters, for which it was wholly unnecessary. When a tie-beam was used it frequently did not fulfill the function implied in its name, but carried the king-post instead of being carried by it. In some of the later roofs, where a flat pitch came into vogue, the beams were actually framed together into a cambered form. Then the office of the king-post was undoubted. It was merely a vertical strut supporting the heads of the rafters

There is no doubt about the purpose which the king-post in a modern low-pitched roof serves, and is intended to serve. It supports the center of the tie-beam, which is inclined to sag, thus affording a firm bearing from which the central portions of the principals can be strutted up. It is only when we come to steep-pitched roofs of complicated construction that king-posts give place to timbers which act in compression, like the stern-post in some spires. King-posts for ordinary roofs may be used up to a span of 30 feet, beyond which queens are employed, so that the unsupported bearing of the tie-beam shall not exceed 15 feet. The strength of a king-post is a point that has excited some difference of opinion, and even error. The tensile strength of any timber is clearly that of its smallest scantling, and to obtain a sectional area of 4 inches by 3 inches it may be necessary to cut a king-post out of 4 inches by 6 inches or more, to allow for forming shoulders. The method in use for calculating the required scantling of a king post is to multiply its length by the span of the roof in feet, and this by a constant number, the result giving the sectional area of the king-post in inches. The constant number is the fraction 0.12 for fir, or 0.13 for oak. Thus, with a fir roof of 24 feet span at one-quarter pitch, we have $24 \times 6 \times 0.12 = 17\frac{1}{4}$ inches nearly. A king-post 5 inches by $3\frac{1}{2}$ inches would give a sectional area of $17\frac{1}{2}$ inches, which would meet the case without waste of material. The tensile strength of fir is $1\frac{1}{2}$ tons per superficial inch, so that a king-post of $17\frac{1}{2}$ inches area would sustain $26\frac{1}{4}$ tons before being torn asunder. It will be seen that we have assumed the king-post to be so securely fixed at each end that it can only break by rupture across its smallest scantling. In practice, however, it is impossible to insure this. The strength depends entirely upon the fixing, because this would give way long before the actual tensile strength of the wood could be endangered. The heads of the rafters being tenoned into the shoulders of the king-post, the latter are liable to give way by shearing or splitting and sliding upward. The resistance to shearing in this case depends upon the thickness of the timber and the depth of the shoulders, and it is only equal to 500 pounds per superficial inch. If the king-post were $3\frac{1}{2}$ inches thick, and the depth of the shoulders 9 inches, we should have twice $9 \times 3\frac{1}{2}$, which would give a shearing resistance of about 14 tons—little more than half the tensile strength of the king-post itself, as already calculated. The importance of cutting deep shoulders to king-posts will thus be easily realized, The extra length of timber often affords a useful support to the ridge-piece.

In a low-pitched roof the horizontal thrust of the rafters against the head of a king-post between them is considerable. It causes the central fibers in the king-post to be very closely gripped—so closely indeed that the tensile strength of the king-post relieves some of the vertical strain tending to shear off the shoulders. Great depth of shoulder is therefore more necessary for steep than for low-pitched roofs. The foot of a king-post is sometimes secured to the tie-beam by means of an iron strap secured with bolts. Here we have the shearing strain without any horizontal pressure to relieve it, except the grip obtained by tightening the bolts. In estimating the amount of shearing strain, we should consider what portion would slide out if the strength of the material were to give way. This would be a piece equal in size to the thickness of the king-post by the diameter of the bolt, by the hight of the latter from the foot of the post. If the thickness were $3\frac{1}{2}$ inches and the hight of the bolt 6 inches, we should have a shearing surface of 21 inches, capable of resisting about $4\frac{1}{2}$ tons. There would really be two of these shearing surfaces, but they would be so close together, owing to the small diameter of the bolt, that it would only be safe to calculate upon one. The foregoing is not the most convenient way of fixing a king-post, as it does not afford means of tightening it up. When a bolt is inserted vertically into the king-post, so that it can be tightened up by means of a nut and washers on the under side of the tie-beam, an aperture being cut in the king-post to admit a head or nut and washer, the shearing strength is due to a surface which is equal to the circumference of the washer multiplied by its hight above the foot of the king-post; but half the result should be taken for safety.

Some persons prefer not cutting away to form shoulders in king-posts, on the ground that extra strength is derived from the material allowed to remain. Others, again, think that, as most of the fibers are cut through in forming tenons, no strength is lost by cutting away for shoulders, while the carpenter who takes a pride in his work regards a king-post without shoulders as a piece of ugliness. There is no doubt, however, that some extra strength is obtained by omitting the shoulders, because the fibers which pass down on each side of the tenons are not cut through. Mere neatness of appearance need not trouble us when roof timbers are out of sight; and in all ornamental roofs a good margin of strength can be afforded. In oak the shearing strength amounts to 700 pounds per superficial inch, besides which this wood offers so much resistance to lateral compression that it is not likely to be impaired by the horizontal pressure of the heads of the rafters. It is therefore in every way a suitable material for king-posts, although it is most unsatisfactory in any situation where transverse stiffness is required.

## NEW PUBLICATIONS.

LAW WITHOUT LAWYERS: A Compendium of Business and Domestic Law for Popular Use. By Henry B. Corey, LL. B. Size 7 x 5 inches, 416 pages. New York: A. L. Burt. Price, $1.25.

Mr. Corey, who is a member of the New York Bar, has written a book that will prove of great practical value to large numbers of business men, builders and others. The book, as the title implies, has been prepared with special reference to those who have not had a legal education. Technical law terms and legal phraseology have, so far as possible, been omitted, or where it was necessary to make use of them they have been explained or translated into ordinary language. The very fact of this paraphrasing, if we may so call it, having been successfully accomplished is conclusive proof that the writer was competent to his task. Without a thorough knowledge of the law the exposition and intelligent and simple use of its terms would have been impossible. As it is, a subject which to the ordinary mind is utterly incomprehensible is brought into such a form as to be readily understood at the first reading. A very wise discretion has been shown by the writer in his choice of subjects, only those of general interest being dealt with. The difficulty of preparing such a work lies not so much in condensing and explaining the law on topics of general interest as it is in knowing what to omit. The literature of law is so very voluminous that it is no easy matter to compile a brief and simple digest. The book is divided into 24 chapters. Beginning with the general subject of contracts, partnerships, &c., the law governing domestic and business relations of individuals is next treated of. The remainder of the work has reference to patents and trade-marks, assignments, deeds, mortgages and wills, as well as many other topics of general interest. At the end of the book is a brief dictionary of legal words and phrases which will be found very convenient for reference. The whole arrangement of the book is excellent, and, besides being carefully indexed, each paragraph has its subject designated in heavy type, which enables the reader to ascertain the contents of a chapter with great ease, and to find without delay the particular subject of which he may be in search. In cases where the law is not uniform throughout the country a list of the several States is given and the difference pointed out. From the brief description we have here given of the contents of this book its value as a work of reference can be readily judged. Considering the enormous sums of money that are annually wasted in useless litigation, any work that will enlighten the public on the legal right and wrong of things must serve a most excellent purpose. This object has been well accomplished in the book under review, and no further recommendation is needed to insure its popularity.

The building of new universities under ordinary conditions is a thing not to be encouraged as long as existing institutions of learning are equal to the necessities of the occasion and could do more and better work with proper endowments. But Senator Stanford's proposed University in California is not an ordinary project. It will not be added to the long list of buildings with no means of support if, as reported, he intends to endow it with $20,000,000. With such a sum the greatest university in the country may be established, wholly free from dependence upon the fees of students or the gratuities of the public. So far as experi-

ence proves anything, universities cannot be "made to order;" they need time for growth, but a good start can be made with $20,000,000, and that fund properly administered should eventually provide a school for the Pacific Coast fitted both to teach the students and to provide leisure time and the means to the professors to pursue original investigations for the benefit of mankind.

## TRADE NOTES.

WE HAVE RECEIVED from Daniel T. Ames, publisher of the *Penman's Art Journal*, at 205 Broadway, New York, a copy of a Grant memorial photo-lithograph from an original pen-and-ink design executed at the office of the journal mentioned. The size of the original was 24 x 32 inches. The size of the print is 22 x 28 inches. This design has been prepared as a premium to be given to each subscriber to the journal for the New Year. As an example of pen art it is very creditable, and the memorial is one that would suitably adorn any office or library.

AT THE NOVELTIES EXHIBITION held in Philadelphia last fall Messrs. J. B. Shannon & Sons made a very interesting and attractive display of art metal-work. This firm, as our readers know, have been making a specialty for some years past of gratings, grills, railings and other similar work constructed in wrought and cast brass. Their office fittings and church-work are especially fine. Their display at the Novelties Exhibition won for them a silver medal.

AT THE RECENT fair of the American Institute Messrs. Wm. E. Uptegrove & Bro., with yards, office, warehouse and sawmills at 457–475 East Tenth street, New York, made a very interesting exhibit of mahogany lumber. The idea in view was to popularize this material and to instruct the public as to its merits, beauty and uses. A neat circular was distributed which contained many particulars respecting this material that are of interest to builders.

MESSRS. W. C. YOUNG & CO., of Worcester, Mass, are directing attention to their wood lathes. They claim for them superiority of design and construction. The cones are all reversed; the bearings are large and carefully scraped to a fit. On their pattern-makers' lathe the thread for the back face-plate is always covered when not in use. We are assured by this firm that no pains are spared to make these lathes first class in every particular.

THE UTILIZING of wind-power for pumping and other purposes is year by year attracting greater attention. Many large establishments exist in different parts of the country devoted to the production of windmills or "wind engines," as they are frequently called, and it is surprising to see to what an exact science the means of utilizing the wind has been reduced. Builders are especially interested in matters of this kind, because a windmill is one of the best appliances that can be used for pumping to supply residences with water. We have recently received from the Eclipse Wind Engine Co., of Beloit, Wis., a complete set of their catalogues devoted to apparatus of this kind for use in connection with railway water stations, factories, dwellings, gardens, &c., showing also power windmills for general farm, mill and elevator work. Accompanying the catalogues is a circular of the Hill friction clutch, an article which is useful in various directions, especially where power is to be conveyed by wire rope or other similar means for some considerable distance.

CHAS. A. STRELINGER & CO., of Detroit, Mich., whose tool basket we referred to in an answer to a correspondent in the December number of *Carpentry and Building*, write us calling attention to a misspelling of their name on that occasion. By a typographical error we called them "Strelmyer" & Co. We had no intention of calling anybody names, and are perfectly willing to be forgiven. We hope that none of our subscribers' letters addressed to this firm went astray on account of this mistake.

WE HAVE RECEIVED from the Cincinnati Molding Co. a catalogue of their carved moldings and panels representing a new line of manufactured ornamentation that is of interest to cabinet-makers, furniture men, architects and all who have to do with the design and construction of fine finish. The illustrations represent designs embodying geometrical and foliated patterns produced by a special machine which this company have recently introduced. While intended primarily for furniture-makers, many of the designs shown are adapted to use in interior house finish. The catalogue is priced throughout for work in walnut, cherry and mahogany.

THE COMPOSITE IRON WORKS CO., 83 Reade street, New York, have issued an illustrated catalogue of the Bostwick patent folding steel gates and guards, which they manufacture. These gates are made in numerous designs and are suitable for a variety of purposes, including day-door for bank vaults, guards for doors and windows, entrance and driveway gates, bank and office gates, safety gates for baggage and sleeping cars, ferry gates, elevator guards, &c. They are ordinarily made of rolled steel, but for fine work can be made of solid brass or bronze, or nickel-plated or electro-bronzed steel. A gate 10 feet in width can be folded in the space of 10 inches and turned sideways, so as not to obstruct the passage. Some 20 full-page plates illustrate the gate as applied to different purposes. Detail views are also given showing the construction of the gates. Several pages at the end of the pamphlet are devoted to a list of places where these gates are in use. The catalogue is printed on highly-calendered paper and the cuts are very finely executed. The cover is especially deserving of notice because of the artistic merit of its design. In point of beauty it is far superior to the majority of decorations which appear on trade catalogues.

THE SPRINGFIELD WOOD WORKING CO. is the name of an organization recently formed at Springfield, Mass. The business of the company is that of designing and making fine woodwork of every description, including doors, sash, blinds, &c. A building on Hillman street, four stories high, 32 x 130 feet in plan, is being fitted up with the latest improvements in machinery for the work named. We understand that particular attention will be given to designing and executing fine interior decorations, which is to be a leading feature of the business. The company expect to begin operations early in the present month.

THE WESTERN MINERAL WOOL CO., located at Cleveland, Ohio, offer to architects and builders a supply of the material indicated in the name of their organization, and which is at present largely used for deafening and non-conducting purposes. Samples are supplied to expectant purchasers, with full particulars of cost, method of use, &c.

THE LANE MFG. CO., of Montpelier, Vt., direct attention in this issue to a full line of wood-working machinery of their manufac ture. Numerous tools and machines are named which are interesting to our readers. Catalogues and price lists are supplied upon application.

THE SMITH & ANTHONY STOVE CO., of Boston, have prepared a number of interesting pamphlets that serve as introductions to the fine line of goods which they manufacture. In their card in another part of this issue they invite requests for "Our Homes, and How to Heat and Ventilate Them," and "Some Artistic Fireplaces." These little books are handsomely illustrated and are replete with interest to all who are about purchasing heating apparatus.

THE FORSTNER AUGER BIT, which has already been illustrated and described in these columns, was very prominently exhibited at the fair of the American Institute, in this city, recently closed. The enterprise of the Bridgeport Gun Implement Co., who are the Eastern manufacturers, in making this display was rewarded by the article receiving the first premium. The tool is an interesting one, and is a desirable addition to the "kit" of any wood-worker.

THE SYRACUSE TWIST DRILL CO. call attention in this number to the agencies for their goods which have been established in New York, Chicago and Baltimore. Twist drills adapted to wood-workers' purposes have many friends, and our readers will be interested in knowing that these goods are being very generally carried in stock by dealers in mechanics' tools.

A NEW FORM of laundry table, which is cheaply manufactured and which is said to possess merits that insure rapid sales, is being offered by Ellison Bros. & Fiegel, of Alleghany, Pa. Their card in another column of this issue directs attention to the terms which they are prepared to make with carpenters and other wood-workers.

WE HAVE RECEIVED E. C. Atkins & Co., Indianapolis, Ind., a copy of the new edition of their catalogue and price list of saws and saw tools. It is a handsome pamphlet of some 72 pages, and admirably illustrates the product of this well-known establishment. We understand that it is sent free to applicants.

THE CLINTON WIRE CLOTH CO. have erected at Clinton, Mass., a new mill for the fabrication of hexagonal netting and fencing. The new building, which is the seventh mill erected by this company, is 50 x 100 feet in plan and two stories in hight. It is built of brick, with stone window sills and caps, trussed roof, hard-pine timbers, and flooring of 4-inch spruce plank, with 1-inch birch on top. Nearly two-thirds of the wall space is windows, which make the mill unusually light. The windows are glazed with hammered glass, which gives a soft and well-diffused light.

SAMUEL C. TATUM & CO., of Cincinnati, inform us that they have advanced the wholesale price on their cabinet scrapers to $9 per dozen. A corresponding advance has been made in the retail list, and the price of the tool hereafter will be $1, postpaid. These goods have obtained wide notoriety, and are greatly appreciated by many who are using them.

IN THEIR CARD in another column Merchant & Co., of Philadelphia, in directing attention to their guaranteed roofing plates, call attention to their scheme of stamping each sheet in every box with the brand, and also with an indication of the gauge. By this plan architects have it in their power to compel the employment of first-class roofing plates, simply because the roofs, when finished, will contain the evidence of the kind of plate used. Quality and thickness of plate by this method are so indicated as to make the substitution of other plates than those specified practically impossible.

AS A RESULT of his display at the American Institute, J. Q. Maynard was awarded several medals. On the Harrington hand elevator he received "Medal of Superiority;" on the Wythe dumb waiter a "Medal of Excellence;" on the overhead railway which he showed also a "Medal of Excellence," and on the Victor caloric engine a "Medal of Superiority." His hydrocarbon burner was awarded the "Medal of Excellence." At the recent Novelties Exhibition in Philadelphia the Harrington hand elevator was awarded the highest medal granted at that fair.

GUMMEY, SPERING, INGRAM & CO. are directing attention to their Pontymister Old Style roofing plate, and also to Alderly roofing plate, the latter being a somewhat cheaper article than the former. In their card in this issue they also mention the triumph of the Patten metallic shingles at the Novelties Exhibition at Philadelphia a few months since.

# CARPENTRY AND BUILDING

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## NOTES AND COMMENTS.

A SHORT TIME since the unqualified advice of architects, sanitary engineers and physicians was in the direction of high ceilings for rooms in dwellings. The arguments in support of a generous space were numerous, some of them referring to the exterior effect of the structure, and others relating to the healthfulness of the room itself. In the course of time a change has taken place. With the introduction of so-called Queen Anne styles in architecture ceilings have gradually become less lofty, not so much, however, for some good scientific reason as on account of following a fashion or blindly imitating ancient prototypes. Quite recently, however, it seems that scientific arguments are being offered in favor of low ceilings. Low walls to rooms, it is said, are being advocated in England as really affording better ventilation throughout, in preventing the formation of upper strata of all but immovable foul air, and tending to prevent draft. This idea is very gladly taken up by some of the art journals, who rejoice that we have probably gone to the extreme in the hight of apartments, which has the disadvantage of dwarfing the furniture which is placed in them, and which also fails to secure the most pleasing proportions to rooms not having large area. The suggestion of low ceilings is considered to have an artistic value. There is a coziness in a low-ceilinged room which in a high-ceilinged room is sacrificed to emptiness. One of our exchanges, in discussing this point, refers to the time of Queen Elizabeth and the low wainscoted rooms that prevailed at that period. Low ceilings were the rule, and comfortable interiors rather than imposing exteriors were studied.

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THE ordinary modes of framing are very defective when they are investigated, either from the standpoint of a practical builder or from the point of view occupied by an insurance man. Materials are employed apparently without any adequate conception of their nature or real usefulness, and sometimes are placed in buildings in such ways as to be detriments to the structure, instead of elements of stability. A letter which we have recently received relating to this subject recounts an incident that we have no doubt will be of interest to our readers. Our correspondent says: "A few days since I went over a house now in progress of construction that will cost $30,000. The basement walls are of stone and the upper part is of wood. Across the upper drawing-room I found an exceedingly heavy iron beam, but for what purpose it is put there I cannot understand. One end rests over the top of a window, and the other over the top of a door; each end is sustained by a hard pine plank 2½ inches thick by 5 inches wide, laid flat. At the head of the stairway against which the stairs are to rest is a beam some 10 x 12 inches, one end of which is framed into an ordinary floor joist 2 x 12 inches. Alongside the floor joist is another heavy beam, one end of which rests on the wall, and the other of which is tenoned into the first-named heavy timber; on this latter beam a heavy partition is to be placed. Other faults of the same general kind are to be found in the same house." This letter comes from a practical insurance man, and one who is accustomed to consider the construction of a building, as well as its fire exposure, before issuing a policy upon it. With such foolish blunders as narrated above to be found almost everywhere, it is no wonder that the insurance people are becoming very critical.

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SOME of our exchanges are discussing the very extensive use at present of glass as a building material, and one of them has hinted at its use in the sense of its superiority over other materials. Still another calls attention to its employment as a fashionable feature. It would seem, on the the other hand, that in some cases at least glass is used on the basis of utility. Light is wanted in the interior of stores, and can be obtained by making the walls—or considerable portions of them—translucent. Modern construction supports a building on what a few years since would have been regarded as very fragile columns. Massive piers have given way to small columns, and the interior spaces are filled with glass, at once changing the appearance of our buildings—or rather the style of our street architecture—and yet affording a flood of light for display of the goods which the buildings contain. Glass cannot be said to make a handsome front. A glass front is handsome to the uneducated eye only. It is impossible to create architectural effect with glass, because it presents a dead level and monotonous surface. It is impossible to make an imposing front of glass, because there is lacking weight, solidity and massiveness. Granite will take the polish of glass, and will yet retain a dignity and force always impressive, and which glass never possesses. A glass front is a thing of necessity, and not of choice.

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FURNITURE-MAKERS are to-day using lumber which was called worthless ten years ago. Whitewood or poplar is used in immense quantities, notwithstanding its warping qualities. The growing scarcity of our natural supply of lumber leads manufacturers to experiment with so-called "worthless" varieties. Cypress is working into favor for architectural finish, and we would not be surprised if some enterprising manufacturer should come out with a most desirable piece of furniture, possessing a delicate, finely-marked grain, and yet consisting of nothing but unpretentious cypress. Hard pine makes a nice looking job when finished in good shape, but has the serious objection of being full of pitch. Cypress has much the same appearance as hard pine, but the pitch is happily absent. The wood commonly known as "gum" has been successfully utilized. It is being worked into a great many forms, despite its well-known warping qualities, which are represented as being so great that the lumber "will not stay in the same county two successive nights." We are informed that picture frames have been successfully made of gumwood, and rumor adds that the very qualities which have hitherto condemned it have been utilized in the manufacture of self-rocking cradles.

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A VERY gratifying indorsement of the value of the "Handy Estimate Blanks," which have been described in these columns in the past, was contained in the issue of the *American Architect and Building News* for January 9. Our esteemed contemporary announced a competition in $5000 houses, and made one of the conditions that each design should be accompanied by a bill of quantities prepared on the "Handy Estimate Blanks," and further recommended that in the arrangement of the schedule the "Practical Estimator" should be consulted. By this stipulation the real work of estimating as every day practiced by careful builders is brought home to architects and designers. The object of this condition in the competition above named, which our contemporary characterizes as important and unusual, is that a competent builder is to prepare an estimate on each design, and the schedules to be submitted are to facilitate his work. In this feature of the contest our contemporary is in some respects following the example set by this journal in some of its contests in the past.

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THE term "servile imitation" is high sounding in character and has been used with great effect by would-be critics and teachers in art affairs. The public has been enjoined not to use anything which is merely an imitation of something better. The admonition, however well meant, has seemed at times harsh and unreasonable. In its effect it would deprive a poor man of his chromo because he is unable to purchase the painting, worth fabulous sums, of which the chromo is an imitation or copy. It would also restrain the poor man from many pleasing effects in interior decoration simply because they imitated to a greater or lesser extent effects produced on a much grander scale where cost is not restricted. Instances might be multiplied going to show the unreasonableness of the injunction without qualifications. At best almost everything we have is in one sense or another an imitation of something better. The *dictum* that we are not to imitate costly effects in interior decoration with simulated material, for example, is a false one. If this were carried out it would leave the rich alone to enjoy the full pleasures of modern design. It is sufficient if the material is adapted to its purpose. This consideration or qualification leaves freedom of choice, which cannot fail to be appreciated by those who have been annoyed by the unconditional prohibition contained in the law of the past. At the same time material should be used for what it is. Plaster-work and color effects are

good in their way, but when they are combined to make an imitation of a costly marble, for example, artistic sense is offended.

THE new railway bridge over the Ohio River, between Evansville, Ind., and Henderson Ky., which was formally opened for traffic late in the summer, enjoys the distinction, we believe, of having the longest single-span girder of any bridge in existence. It is built on the triangular truss plan and is very symmetrical and pleasing in appearance. The bridge has a length of 3200 feet and rests on 10 piers. The spans are 250 feet long each, with the exception of the one over the main channel, which is 525 feet in length. This span is 103½ feet above low-water and 57 feet above high-water mark. The bridge at Cincinnati, built several years since, has a clear span of 515 feet, and was at the time of building the longest railway girder known. It will be seen by the above that the girder of the new bridge exceeds it by 10 feet. Previous to the erection of the Cincinnati bridge the longest length of single-span girder was the Kinlenburg bridge, in Holland, with a span of 492 feet. It is not likely that the Henderson bridge will long enjoy its distinction. Several plans of bridges have been drawn in which single-span girders are shown of greater length than this, one in particular being that of the proposed bridge across the Hudson at Poughkeepsie, which is to have a span of 800 feet.

ALTHOUGH technical education has been very extensively discussed in the newspapers and trade journals for several years past, and although the need of technical education is very generally recognized, a clear conception of what is really meant by this term scarcely exists in the minds of the majority of those who employ it. Technical education has been defined by Mr. Henry Cunyngham to mean instruction in the art of applying the discoveries of science to the requirements of modern industry. It is not scientific teaching in the strict sense, nor, on the other hand, is it mere craftsmanship. To take an example, the mode of treatment of electrical subjects given in the works of the late Prof. Clarke Maxwell is purely scientific and mathematical; in his hands electricity is an applied mathematical science. In the hands of Faraday electricity becomes an experimental science. But neither the teaching of Faraday nor of Maxwell is of exactly the kind that is suitable for a mechanic. Something more practical is needed; the body of truth must be arranged with a view rather to action than to knowledge. This requires a bent of mind that is midway between science and craft—it is the liberal part of the education of an artisan. We require manual dexterity guided by wide views and scientific knowledge.

THE views of lumbermen on the present use of the various cabinet woods, and especially with regard to some of the finer woods, will perhaps be of interest to our readers. They are reported as follows in the columns of one of our exchanges devoted to the furniture trade: Dealers in lumber in this market say that the idea of imitations in woods is one that cannot last, and a wood that is valuable chiefly because it can be easily stained into an imitation of mahogany or blackened into an imitation of ebony must necessarily give way to the woods it imitates. For instance, they say, cherry, which is mostly used to represent a coarse and dauby, low-grade mahogany, and which costs from $40 to $75 per M, cannot maintain itself against the real wood that may be had at from $75 to $150 per M. They say an article of furniture containing 20 feet of wood, made in cherry, the wood of which will cost from 80 cents to $1.50, will soon have no buyers where mahogany in the same article will cost only from $2.50 to $3. Such articles, actually costing manufacturers from $1.70 or $1.50 more, are said to be sold at from $4 to $6 higher, so that the extra cost to the manufacturers is often trebled or quadrupled to the consumer.

LUMBER dealers say that retail dealers and consumers generally are rapidly comprehending the fact that all the mechanical part of furniture manufacture can be done as cheaply upon mahogany and rosewood as upon cherry or maple, and the finishing with probably less cost, since artistic staining is not necessary, and are beginning to demand that the additional cost of the lumber alone shall enter into the calculation of the advance in price. Manufacturers are said to be rapidly seeing the justice of conceding as much, and the consumer is no longer so easily balked in his hunt after articles in the precious woods. Already the trade in mahogany lumber has felt the impetus of this, and dealers in this wood state there is now more mahogany, baywood and rosewood sold to manufacturers of furniture than in any preceding period, and they say that consumers already seem adepts in figuring the addition that is just in the price of a mahogany over a cherry or walnut suit, whether parlor or bedroom, and the more precious woods seem upon the eve of assuming the place they occupied of old in the estimation of the public. Cherry is said by lumber dealers in this city to have long held a place of prominence, partly on account of being a hard and durable wood, easy to manipulate, but chiefly because it is so easily stained to imitate more precious woods. They say walnut has a field of its own, but the same reason of substitution no doubt contributed to its long-held popularity. They declare that cherry, which has been so nearly entirely esteemed for its imitative qualities, must, under the broad light of the plentitude of mahogany, rosewood and ebony, lapse to the place in the category of lumber to which it properly belongs.

WHAT is thought generally of honest, earnest effort, was illustrated the other day by the *Journal of Commerce*, of this city, which had this to say of an humble worker: "Adam Kallenbacker was only a knife and scissor grinder. In storm and sunshine, in winter and summer, he was to be found daily at the corner of Beaver and William streets, ready for a job. And he rendered most faithful and dexterous service. A knife or a pair of scissors ground by him would cut if there was any keenness to be wrought in the metal, and all the bankers and brokers in the neighborhood gave him not only their custom, but that respect of which he was so well deserving. He has passed away, leaving a better record and a brighter memory than many whose names will be sculptured in marble."

THE use of iron, it would seem by articles in some of our exchanges, occasionally turns on very small considerations. Pittsburgh, of all the cities, from the fact that iron is relatively cheap there, it would seem, should employ this material extensively in the construction of business blocks. But the reverse seems to be the case, so far at least as concerns exterior work. One of the Pittsburgh papers calls attention to the fact that among the many buildings that are now going up or are just finished none are of iron. The improvements of old buildings have in some instances been the removal of iron fronts and the substitution of other material. The explanation of this is said to be that iron means paint, and in the atmosphere of Pittsburgh paint every year. This means large expense and often great inconvenience. The decline in the use of iron in buildings in Pittsburgh pertains to the exterior only. There has been an important increase in the use of it for the interior. It is extensively used in floors in the shape of girders and beams, and also as supports in various positions. For the most part it is thoroughly incased in brick or other incombustible material, thus rendering the building in which it is employed safe from the dangers which attend the presence of iron as a structural element when a fire is in progress.

STUDENTS of architecture and amateur builders who are interested in features of design and construction have many resources at their command outside of those contained in courses of study described in the ordinary textbooks. Winter evenings may be advantageously employed in making models of classic temples and other structures. A good material for this purpose is starch paste, being composed of gum tragicanth dissolved and mixed with powdered starch and sugar. The material is rolled out flat, after which it is cut out according to prepared cardboard shapes, and the parts joined by moisture. Powdered colors can be mixed with the gum, thus varying the effect if desired. Windows can be indicated by the use of perforated cardboard or sheets of mica. The suggestion here contained is not only useful to students, but may be made an agreeable pastime for many who are situated so as to employ it.

BUILDING operations in New York seem to be steadily on the increase. This certainly is true, comparing the last four years one with another. The number of operations in 1881, according to the official record, was 4250. The figures for the years since are as follows: In 1882, 4355; in 1883, 6045; in 1884, 6394; and in 1885, 7900. It appears that 1500 more permits were issued in 1885 than in 1884, and the number of dwellings erected last year was greater by 1329 than the year previous. The total amount invested in buildings in 1885 was over $40,000,000. The building required for the year closed indicates prosperity, not so much by the total cost of the new buildings as by the fact that so many of them are correctly described as first-class dwellings. Nobody can traverse the streets on the west side of the park without wonder at the number of new houses of this description. The demand for buildings of this kind seems to indicate that the supply of very excellent apartment-houses has become nearly equal to the demand, and the same thing appears to be true of tenement-houses—that is to say, the lowest and the highest grade of associated dwellings show a falling off, while the increase is chiefly in costly single dwellings and in flats of moderate cost distinctly above the tenement-houses. At present there seems to be no reason why the building operations in New York should not be quite as large for the present year as for 1885.

Complaints are often made by those using iron saw tables that the table becomes charged with electricity to such an extent as to be disagreeable. The table is undoubtedly charged by the friction of the belt. To prevent the table from becoming charged, run a small copper wire from the leg of the table to a water, gas or steam pipe. Anything that will carry off the current as fast as produced will do the work effectually.

## THE PLATES.

PLATE V.—French furniture reached the highest degree of splendor and magnificence at the time of Louis XIV. It was in the reign of this sumptuous monarch that the palace at Versailles was completed; and, as he desired to fill its spacious galleries with furniture that would rival their decorations in richness, he commissioned numerous talented artists, under the direction of Lebrun, to prepare designs for the various articles required, apparently without any regard to expense. The principal object appears to have been to produce something as striking and gorgeous in appearance as possible, and that they succeeded in their efforts in this direction is fully proved by the numerous elaborate pieces of furniture which have come down to us from this period. The names, also, of many of the designers and art workmen who assisted in producing these costly specimens of cabinet-work are preserved, although it is impossible in some cases to identify the handiwork of each master. The artists who figured most prominently in connection with the design or manufacture of cabinet furniture in Louis XIV's reign, were Jean and Claude Berain, Le Pautre, also a great decorative designer, Daniel Marot, and André Charles Boule—the last mentioned the inventor of the class of work inlaid with tortoise-shell and brass which bears his name. As we have remarked, the chief characteristic of Louis XIV furniture is magnificence, and it would therefore necessarily be quite out of place if adapted to an ordinary small dwelling. It requires costly surroundings, and is essentially a style suitable for a palace or an extensive mansion, not for a cottage. From a constructive point of view, furniture of this period is often open to serious objections, but it was undoubtedly the most suitable that could have been placed in the magnificent apartments for which it was originally intended. As is the case with other styles, it faithfully reflects the characteristics of the age, which was one of glitter and display, in strong contrast with the ultra refinement and delicacy which prevailed later on during the reign of Louis XVI. The examples we give in Plate V represent legs and other supports to tables, cabinets, &c., and the two lower ones are clock-stands. They are chiefly from designs by Berain, and the enrichments would in most cases be of chased brass, gilt and mounted on a groundwork of ebonized wood.

PLATES VI AND VII.—The houses which architects build for themselves are always of interest to a curious outside world, and the more eminent the artist the more interest there is in his efforts to design and plan a house to meet his own ideas. In Plates VI and VII we show a perspective view of the residence of Achille Hermant, a French architect who has recently became a member of the Royal Institute of British Architects, together with a longitudinal section and the plans of the several floors. The various rooms are indicated by numbers on the plans, and are as follows:

13. Vestibule.
14. Waiting-room.
15. Parlor.
16. Principal staircase.
17. Billiard-room.
18. M. Hermant's office.
19. Water-closet.
20. Open space.
21. Drawing-room.
22. Bedroom.
23. Water-closet.
24. Dressing-rooms.
25. Dining-rooms.
26. Office.
27. Bedrooms.
28. Bathroom.
29. Linen closet.

Mr. Hermant is credited with occupying a foremost position among the architects of Paris. Some time since he erected for himself a house in the Rue Legendre, a street near the Parc Monceaux, which for various reasons has attracted marked attention. He departed from the usual practice, and, instead of a very tall building, he erected a house of a size that would be sufficient for his own requirements. Compared with many in the neighborhood it could be called a cottage. It is set back from the street at the front while the rear overlooks a very attractive garden. It could be said that the key to the arrangement of the elevation was found in the initial letter of the owner's surname. As the letter H is made up of straight lines, so the house was made to exemplify lintel architecture. With the exception of the basement, arched openings are absent. The details are very fine, and much admiration has been expressed at the general result. The building has a frontage of something over 40 feet, and a depth of about 56 feet.

PLATE VIII.—The design for the paneled ceiling shown in Plate VIII is by L. Beauregard, Paris, and was executed in oak by Layared, a carpenter of Marly, France, for the vestibule of the Chateau Val d'Aucké, Port-Marly. Its size as given by the builder was some 12 by 19 feet. The sections which we present do not show construction so far as the individual elements are concerned, but indicate the profiles employed. The dimensions in the drawing are to the metrical scale (1 meter = 39.368 inches).

## New Kind of Brick.

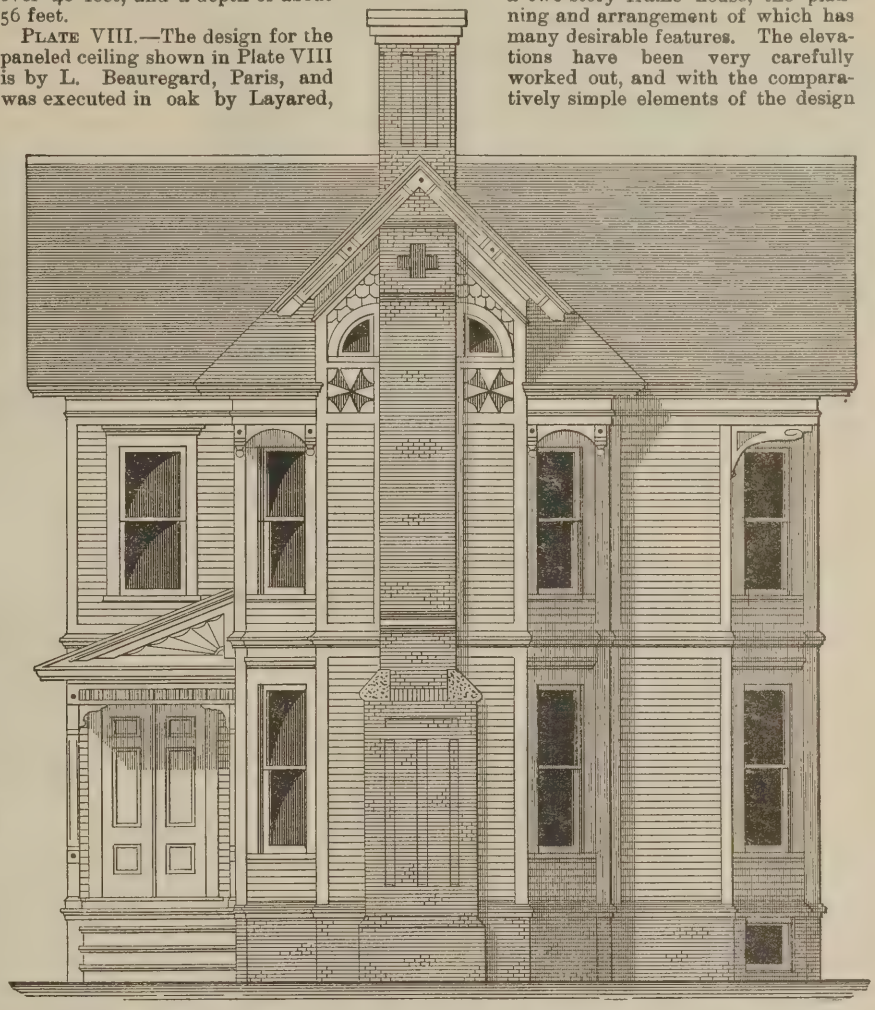
Messrs Bleininge and Hasselmann, two German chemists, have, it is said, recently patented a method for obtaining products that will be more resisting to humidity, &c., than ordinary bricks and tiles. After drying and grinding the clay they make a mixture as follows:

| | Parts. |
|---|---|
| Clay | 91½ |
| Iron filings | 3 |
| Table salt | 2 |
| Potash | 1½ |
| Elder or willow wood ashes | 2 |

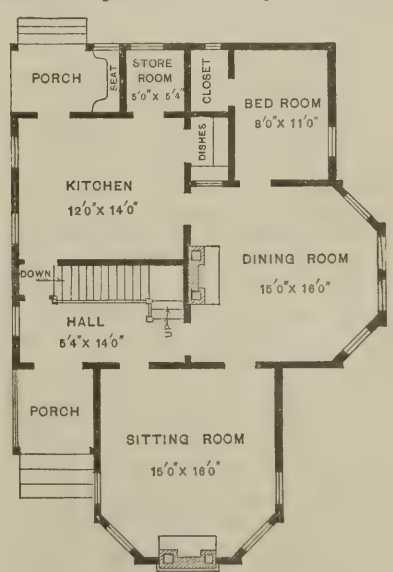
The whole is heated to a temperature varying from 3362° F to 3632° F. At the end of from four to five hours the argillaceous mixture is run into molds, then rebaked in the ovens—always protected from the air—at a temperature of 842° F. to 932° F. The product may be variously colored by adding to the above 100 parts: 2 parts of manganese for a violet brown, 1 part of manganese for a violet, 1 part of copper ashes for green, 1 part arseniate of cobalt for blue, 2 parts of antimony for yellow, and 1½ parts of arsenic and 1 part oxide of tin for white. These products resist the action of acids, and are well adapted for sewers, &c.

## Two-Story Frame House.

In the accompanying design Mr. S. A. Bishop, of Smethport, Pa., has presented our readers with a neat and attractive design of a two story frame house, the planning and arrangement of which has many desirable features. The elevations have been very carefully worked out, and with the comparatively simple elements of the design they show the author's intention so fully that we have omitted the usual details. The different rooms are conveniently located with respect to each other, and in the chambers closets are placed where they will be serviceable. The hight of the roof is such that storage-room, if not a sleeping-room, might be obtained in the attic.



*Two-Story Frame House.—Designed by S. A. Bishop, Smethport, Pa.—Front Elevation.—Scale, ⅛ Inch to the Foot.*




*First Floor Plan.—Scale, 1/16 Inch to Foot.*

Spots from sulphur and phosphorus caused by lucifer matches can be extracted from marble by carbon disulphide. Or take two

parts of common soda, one part of pumice-stone and one part of finely-powdered chalk; sift it through a fine sieve and mix it with water; then rub it well all over the marble and the stains will be removed; then wash the marble over with soap and water, and it will be as clean as it was at first.

## The Right to Repair or Rebuild.

The Ohio Supreme Court recently rendered the following decision involving an often important insurance question:

248. Jacob Good *vs.* The Buckeye Mutual Fire Insurance Co. Error. Reserved in the District Court of Summit County.—*Johnson, J.*

A policy of insurance on building against loss or damage by fire reserved to the insurer the right to repair or rebuild, upon giving notice of such intention, within 90 days after proof of loss. After such proof the insurer served notice of its intention to rebuild, "acting jointly with other insurance companies claiming to be interested." At the time of the fire and of this notice there were 10 separate policies in as many different companies upon the same building, eight of which served like notices, severally signed by the company serving them. Before the time expired to rebuild, but while these insurers were taking steps for that purpose, the plaintiff compromised and settled with all said companies so electing to rebuild, except defendant, and released each of them from all liability, receiving for such release an amount of money in the aggregate much less than the amount of these policies. The defendant's policy had this condition: "In no case shall the claim be for a greater sum than the actual damages to or cash value of the property at the time of the fire, nor shall the assured be entitled to recover of this company in a greater proportion of the loss or damage than the amount hereby insured bears to the whole sum insured on said property, whether such other insurance be by specific or by general or floating policies, and without reference to the solvency or liability of other insurance." *Held:*

1. That the liability of the defendant on its policy as a money indemnity for loss or damage by fire was by above quoted condition in its policy several, and not joint.

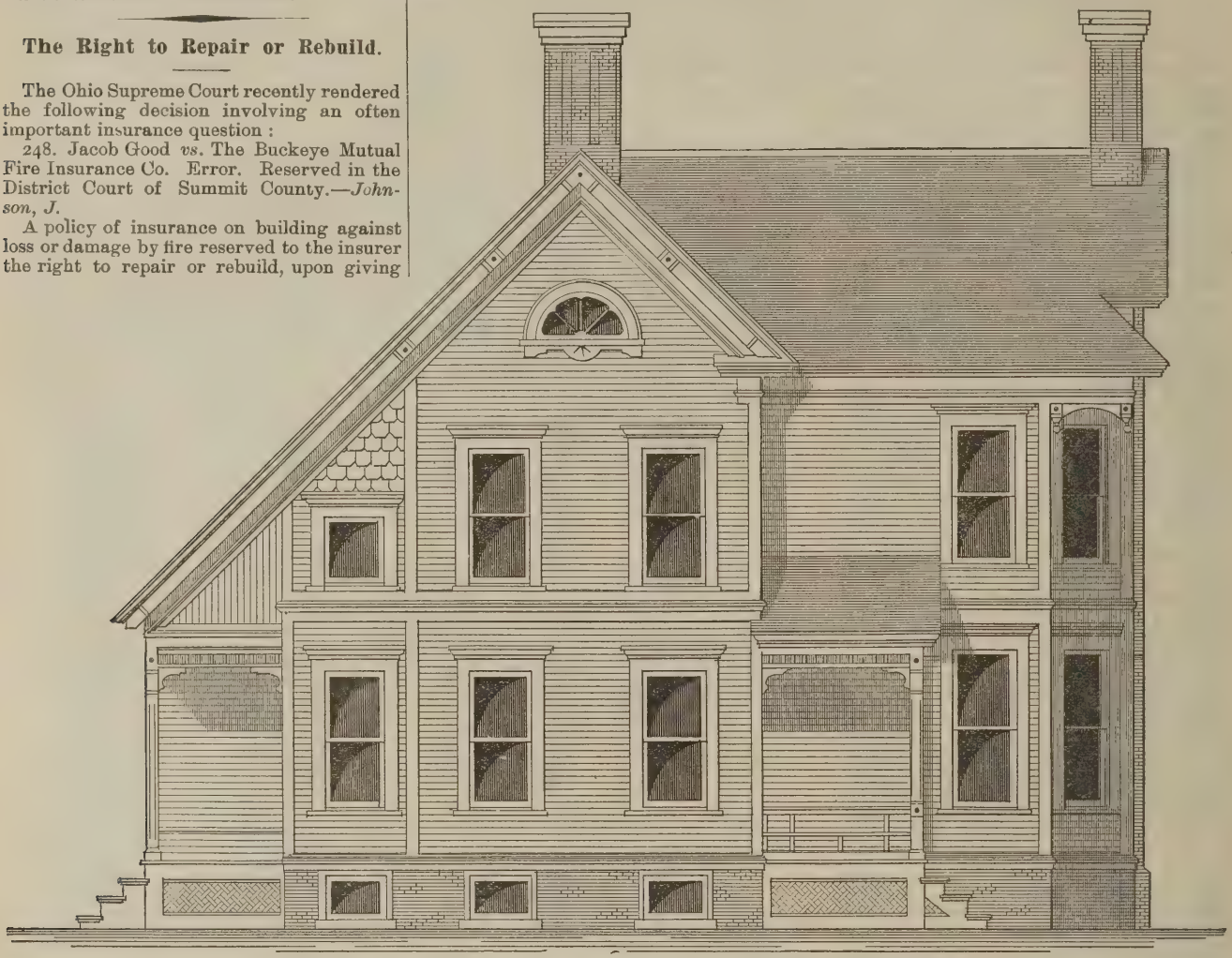
2. That the service by the defendant of its intention to rebuild, acting jointly with the other companies, having like concurrent insurance, and serving like notices, converted the respective policies from contracts for a money indemnity into contracts of indemnity, payable in repairing or rebuilding, to be performed in the time named in the policy, but, if no time is specified, then within a reasonable time.

3. Upon such conversion by the election of the insurers their liability for failure to rebuild is several, and not joint, unless this several liability was by agreement of plaintiff converted into a joint liability. The service of the notices did not operate to change the terms of this policy. Hence the plaintiff may recover on this policy such of the whole damage as the sum insured bears to the whole amount insured, without reference to the solvency or liabiltity of other insurance.

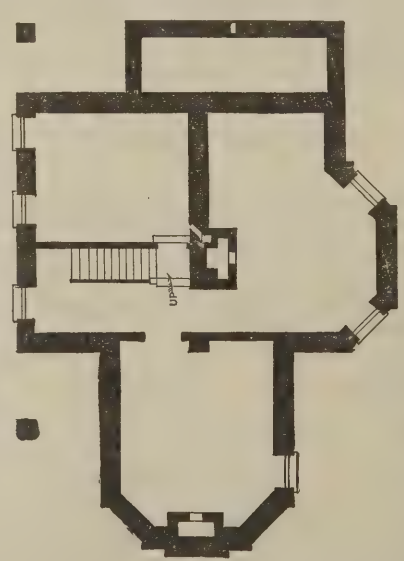
4. That after the policy has been thus converted into a building contract the insured might settle and compromise with any of the companies thus bound to rebuild without releasing the others from such proportionate share of such loss as their policies bore to the aggregate insurance.

5. That in ascertaining defendant's proportionate share of the entire loss reference must be had to the aggregate insurance without regard to the fact that some of the companies had been settled with for a less sum than they were liable for, or that others did not elect to rebuild, or were insolvent or not liable.

Judgment reversed and cause remanded for a new trial.



*Two-Story Frame House.—Left Side Elevation.—Scale, ⅛ Inch to the Foot.*

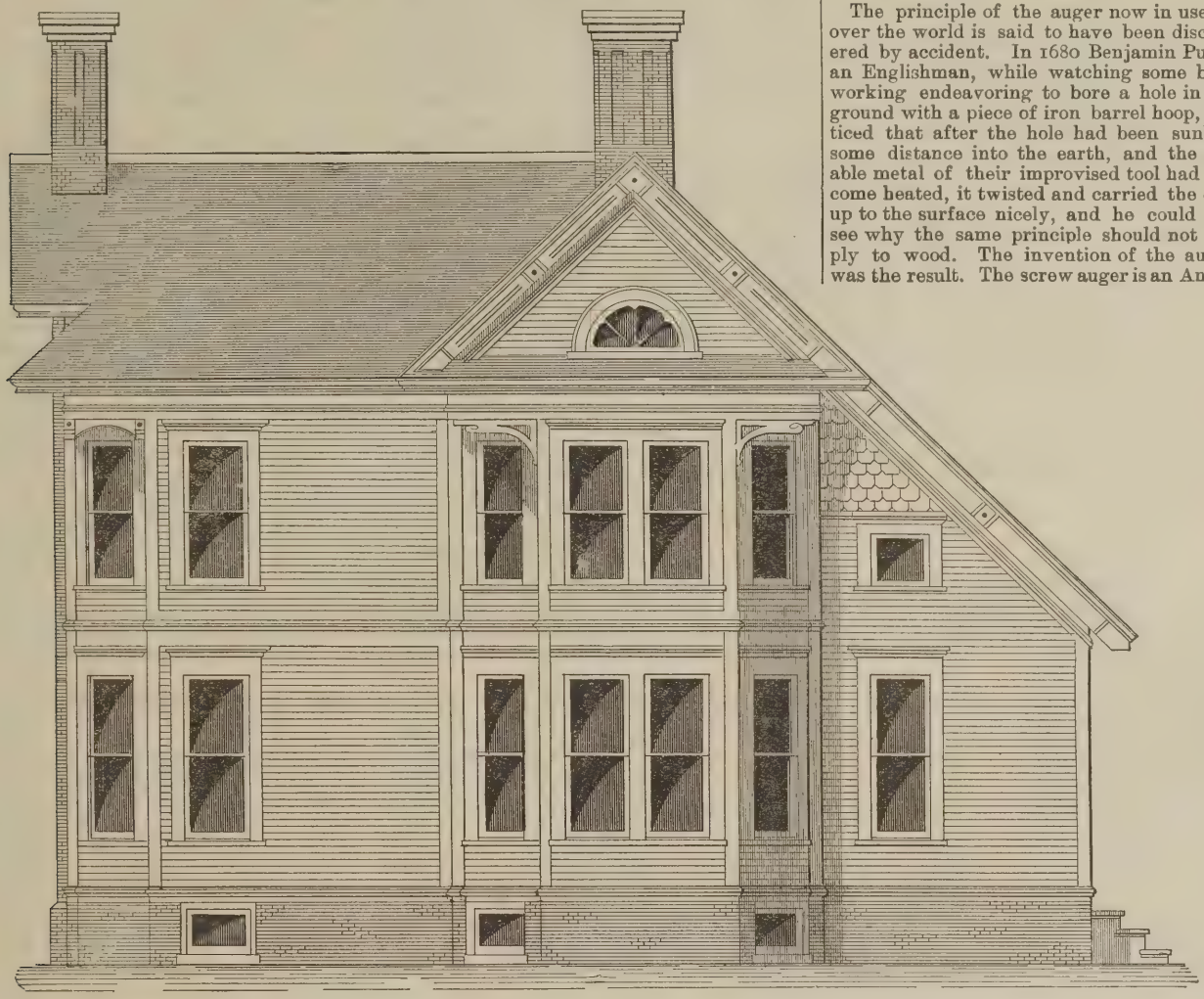


*Foundation Plan.—Scale, $\frac{1}{16}$ Inch to Foot.*

## Sawing Stone with Steel Cords.

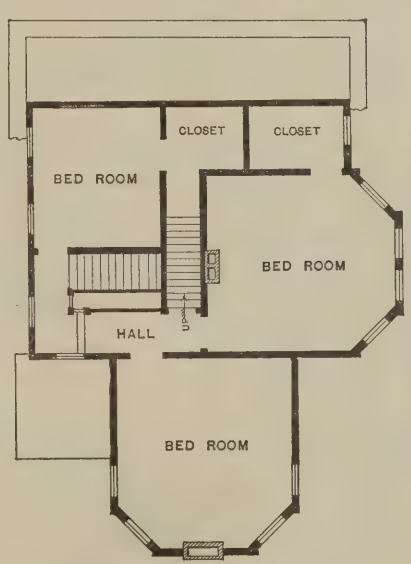
Our readers will remember, says the *American Architect*, the description given some months ago in these pages of a new saw for cutting stone, consisting of a twisted cord of steel, made to run around pulleys like a band-saw. This apparatus has now been perfected and put into use. The cord employed is composed of three steel wires, rather loosely twisted together, but stretched tight over the pulleys, and is run at a high rate of speed. The swift succession of blows from the ridges of the cord, delivered along a narrow line, disintegrate the stone rapidly, and the loosened particles, entangled among the wires of the cord, are said materially to help the erosion. However this may be, the effect of the saw, which is allowed to press lightly on the block of stone beneath it, is much greater than that of the ordinary blades supplied wich sand, the usual rate of cutting in blocks of oölite, or soft limestone, being about 24 inches an hour, and in Carrara marble a little more than 9 inches an hour. The hard granite of Brittany is cut at the rate of nearly 1¼ inches an hour, and even porphyry can be worked at the rate of $\frac{8}{10}$ inch an hour. In rougher cutting, such as is done at the quarries, the saw can be driven more rapidly and with greater press-

ure on the stone, and its efficiency is increased about one-third. In certain marble quarries in Belgium this process, which is known by the name of its inventor, M. Gay, is used on an extensive scale, the blocks of stone being not only divided for use, but extracted from the quarry, entirely by means of the cord saw. In using it for quarrying a suitable portion of the surface of a stratum of marble is first cleared in the usual manner, and a drill is brought upon the ground, resembling the diamond drill, except that the cylinder of sheet steel of which it is made has no diamond set in its edge, but is fed with a hard metallic powder, apparently resembling the chilled iron sand used in this country for cutting and polishing granite. With this drill, which is driven by a pulley and rope, a little shaft is easily driven into marble at the rate of 2 feet an hour, cutting out a cylinder of stone 27 inches in diameter, which is then detached and lifted out, and forms a saleable block without further treatment. Two of these drill-holes having been sunk at a suitable distance apart, guides are set up in them, on which move frames carrying pulleys of a diameter somewhat less than that of the hole; and over these pulleys a cord saw is stretched. Motion is imparted to the pulleys by a simple system of transmission, and the saw cuts without interruption until the bottom of the drill pits is reached. In this way blocks of any size can be taken out, with a waste from saw and drill cuts amounting to only about ½ of 1 per cent., while the loss by the usual methods of quarrying is often 35 or 40 per cent. of the whole amount of stone extracted. The saving of time is even greater than the economy of material, the new appliances accomplishing, it is said, 15 times as much work in a given period as was possible under the old methods.



*Two-Story Frame House.—Right Side Elevation.—Scale, ⅛ Inch to the Foot.*

Carvers' squeezing wax is a preparation that is used for obtaining the exact patterns of carvings, and to give the workmen a clear idea of projections and depths. In cases where it is required to match carvings or ornamentation which are at a distance and cannot be removed wax can be applied without injury. It may be made from either of the following recipes: Suet, 1 part; beeswax, 2 parts. Wax, 5 parts; olive oil, 1 part. Wax, 4 parts; common turpentine, 1 part. The parts only need be melted together and allowed to cool; the wax is then fit for use. It should be well pressed into the carving. Sometimes it is only possible to take the front or side of an object at a time, as it must be drawn off in the form of a mold. The sections, when ready, should be filled with plaster-of-paris and water made into a thick paste and allowed to set. The mold is then removed, and the plaster cast is ready to work from.




*Second Floor Plan.—Scale, $\frac{1}{16}$ Inch to Foot.*

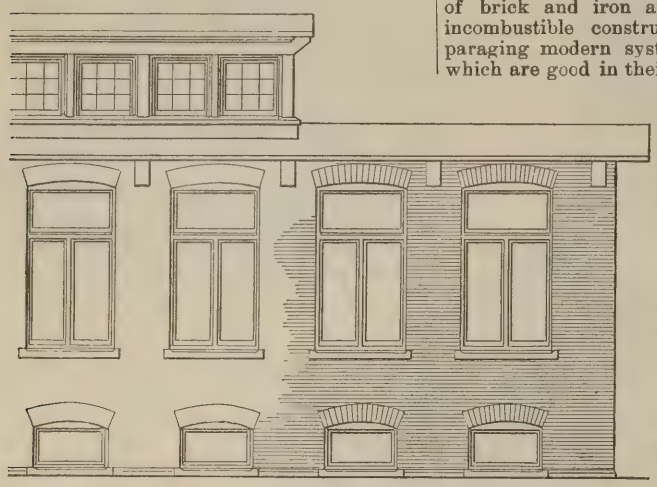
## The Manufacture of Augers.

The principle of the auger now in use all over the world is said to have been discovered by accident. In 1680 Benjamin Pugh, an Englishman, while watching some boys working endeavoring to bore a hole in the ground with a piece of iron barrel hoop, noticed that after the hole had been sunken some distance into the earth, and the pliable metal of their improvised tool had become heated, it twisted and carried the dirt up to the surface nicely, and he could not see why the same principle should not apply to wood. The invention of the auger was the result. The screw auger is an American invention, and was invented about 100 years ago by Thomas Garrett, who lived in the vicinity of Oxford, in Chester County Penn., where most of the black augers are still made. Most of the bright tools are made in the East, but one of the principal manufactories is in Philadelphia. The old-fashioned pod auger is still used in England and Germany. The single-screw auger is also an American invention, and was first discovered by accident by a Philadelphian. It is the only auger that can be used to any satisfaction in very hard woods, where the double-screw augers become clogged.

Although every one is perfectly familiar with this commonplace tool, but comparatively few know the process of its manufacture. In making augers the iron which forms the main or spiral part is welded into the steel of which the tip is made before forging. The bar is then put under hammers and forged into shape. It is then put into what is called a "wringing machine" and twisted up in a rough state into the spiral form, after which it is passed through "crimpers," giving a uniformity of twist. The augers are next put through "straighteners" and revolved, making them perfectly straight, when they are ready for putting on the head, which is the most delicate operation in their manufacture and requires the work of a skilled artisan. They are then subjected to a "grinding-out" process, which consists of putting them through two rubber wheels to rough-polish the twist. The "fitter-up" then takes hold of them and "lightens" or fits the head; then the filers file down and sharpen the heads, after which they pass through the hands of the polishers, where they are polished and hardened ready for market.

## Building to Prevent Loss by Fire.

The prevention of loss by fire by features of construction is a subject to which the Boston Manufacturers' Mutual Fire Insurance Co. have given much attention, and on which the president of the company, Mr. Edward Atkinson, has published several papers and delivered numerous addresses In the autumn of last year, while on a trip to the extreme Northwest, Mr. Atkinson was requested by several insurance companies doing business in the central and northwestern sections of the country to lay before them the results of the work accomplished in the East, with some account of the methods of building by which these results have been achieved. In response Mr. Atkinson delivered a very interesting and instructive address, whether regarded from the standpoint of the insurance man, the builder or the property owner. The address was illustrated by numerous drawings and statistical tables, proving conclusively the advantage of some of the simple methods of preventing fire loss, which he explained.



*One-Story Mill Building.—Fig. 1.—All Brick.—Scale, $\frac{8}{32}$ Inch to the Foot.*

The subject of building so as to avoid loss by fire is one of the utmost importance to our reader. The reproach of American systems of building construction is that they are flimsy and that the resulting buildings are quickly destroyed whenever fire occurs. So general has become the loss of wooden buildings that many are disposed to regard all wooden buildings as being very unsafe, and whenever the idea of building to secure property against the ravages of fire is brought forward the suggestion of a so-called fire proof building goes with it. We think of brick and iron and other features of incombustible construction. Without disparaging modern systems of fire-proofing, which are good in their way, but which also are out of the reach of the masses who build, Mr. Atkinson approaches the subject by pointing out that wood is still a good building material, and if properly used can be made to resist fire for such a length of time as will afford the fire department of a town or village, or the operatives of a factory or the occupants of a building of any kind time to fight it successfully. This, after all, is the principal point to be achieved. An absolutely fire proof building is perhaps impossible at the present day, from the fact that with whatever material we build or whatever construction is employed the building can be destroyed by the burning of its contents if they happen to be of an inflammable or combustible nature.

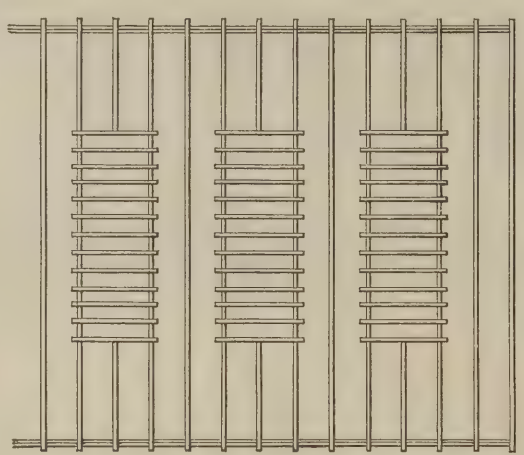


*Fig. 3.—Plan of Roof Timbers.—Scale, $\frac{8}{128}$ Inch to the Foot.*

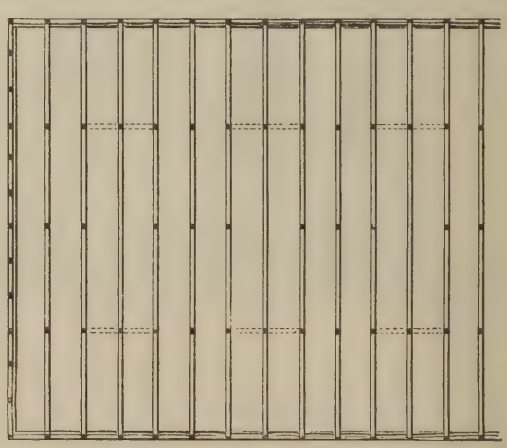


*Fig. 4.—Plan of Floor Timbers.—Scale, $\frac{8}{128}$ Inch to the Foot.*

As being of interest to builders generally, we have reproduced a number of Mr. Atkinson's illustrations. We have already given some attention to this subject, and our readers will remember some illustrations which appeared in our issue for November, 1881, entitled "Slow-Burning Construction for Factory Roofs and Floors." This article contained in brief form all the essential principles of what we illustrate herewith, but since the circular was issued that was referred to at that time the general system of construction outlined has been elaborated and improved in the light of several years of practical experience. The buildings to which this construction applies specially are workshops and factories, including such as cotton, woolen and paper mills, cordage and jute factories, print works and bleacheries, machine shops, metal works, &c. Broadly stated, it applies to factory buildings in general, and yet there is no reason why many of the features should not also be employed in the construction of dwelling-houses. Mr. Atkinson's recommendation for factory buildings is that they be for the most part one-story buildings. In Fig. 1 is presented a sketch of a 1 story all-brick factory, the brick extending from foundation to roof line In Fig. 2 is shown a side elevation of a similar building, in which timber and glass are used above the stool, in order to secure more light. Fig. 3 indicates the roof timbers, while Fig. 4 is a plan of the floor timbers. Fig. 5 is a section of one span. This kind of building may be constructed of any required length and also of any width which the slight pitch of roof will permit without making the central part too high. The span of the main timbers may be increased to 75 feet if the timber used is 18 inches deep. The posts may be set so as to make the width of the bays 10 feet 6 inches, provided 4-inch plank be substituted for 3-inch. These limitations and restrictions are from the underwriter's standpoint, and have reference primarily to the fire risk. Referring to the spans of roof and floor timbers, Mr. Atkinson says that sidewalk glass may be put in the floor to light the basement at such points as the placing of machinery will allow. He advises using the basement for shafting, belting from the basement, as fully as circumstances will permit. He objects to the use of the basement for the storage of raw stock. It may be used, however, for the storage of manufactured goods when their character does not greatly increase the fire risk.

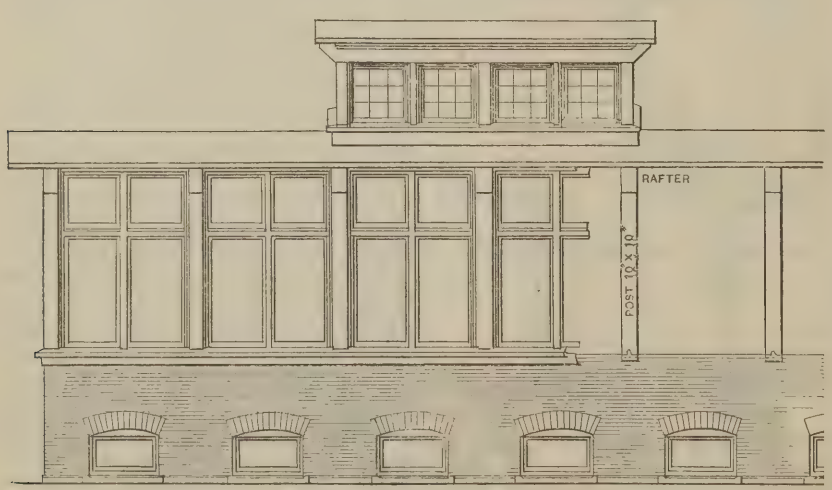



*Fig. 2.—Side Elevation, Showing Timber and Glass Above Stool.—Scale, $\frac{8}{32}$ Inch to the Foot.*

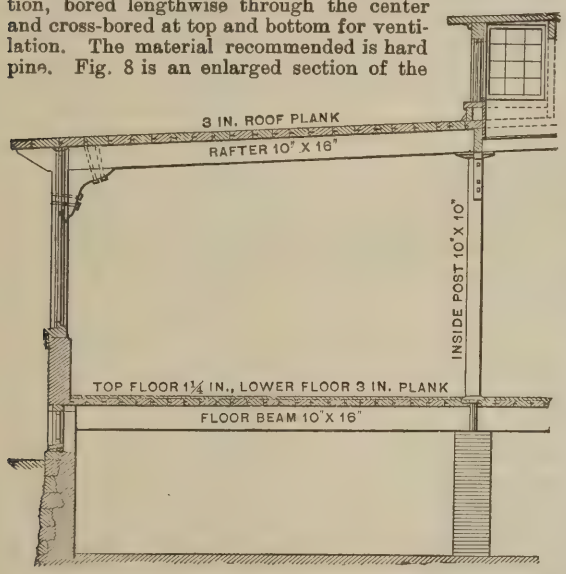
An estimate of the cost of such a building as this from the standpoint of insurance men may be of interest to our readers in this connection. Insurance men who are called upon to pay losses in some cases have the choice between money indemnity or rebuilding. Accordingly, they get the matter of the cost of a building construction down to a very fine point, and when they speak they speak authoratively. Below is the schedule of an estimate made for a building of this kind, 194 by 220 feet, one story high. This would give a floor space of 42,680 feet. The estimate anticipates a basement adapted to shafting only, and the bays to be 8 feet on centers. The items are as follows:

| | |
|---|---|
| Excavation of 3,223 yards at 16 cents.... | $515.68 |
| Foundation wall and pier stone—364 cords at $6..... | 2,184.00 |
| Granite underpinning, window and door sills..... | 972.40 |
| 516,636 bricks laid at $16 per 1,000..... | 8,266.18 |

| | |
|---|---|
| 548,000 feet of lumber at $24 per 1,000 | 13,152.00 |
| Labor on same | 8,836.00 |
| 46,392 feet gravel roof at 7 cents | 3,247.44 |
| Iron and hardware | 1,490.50 |
| Paint and glass (third quality German glass) | 1,933.20 |
| Total cost | $35,597.40 |

Dividing this amount by the superficial feet as given above shows a cost of $83\frac{4}{10}$ cents per square foot of floor.

One of the leading features in the construction of a building of this kind is the thickness of the material employed. Referring to Fig. 5, the planking for the roof is specified 3 inches thick. The lower floor is to be also of 3-inch plank, and the top floor 1¼-inch plank, and between these two either ½ inch of mortar or three thicknesses of tarred paper. In Fig. 6 a section through the wall is shown to larger scale, by which features of construction will be understood. Details of the base-plate are shown in Fig. 7. The dotted lines indicate ears which may be added to this plate in order to fasten the post in place by means of coach screws. Fig. 6 shows a post 10 x 10 inches in section, bored lengthwise through the center and cross-bored at top and bottom for ventilation. The material recommended is hard pine. Fig. 8 is an enlarged section of the window and shows features of construction. The upper sash is arranged to swing as indicated by the dotted lines in Fig. 6. The recommendation is that these sash be fitted with a good transom fixture, so that they may be held shut or fastened open at any angle, as may be required. The lower sash is to be fixed. The engraving shows a single pane of glass. If preferred, the sash may be divided into small panes, in which case it should be glazed with two thicknesses of common glass. Where one light is used for the sash the glass should be rough plate, which has the good property of diffusing the light through the room and preventing the oppressive glare of sunlight. Fig. 9 represents a horizontal section through Figs. 6 and 8. Fig. 12 presents a vertical section through the monitor or raised ventilator above the roof, and very clearly shows the features of construction recommended. The monitor posts may be fastened with angle irons, or they may be framed into the girders and main rafters. Fig. 14 represents a section through the monitor in the opposite direction, and indicates both features of construction. C indicates the angle and D the framing, already mentioned. In Fig. 10 is shown the caps employed at A and B in Fig. 14. Fig. 13 is the details of the pintle and base for the main posts. Fig. 15 is a plan of the monitor, while Fig. 16 is a section through the sash, showing how it is cut on a bevel so as to fit tight, whether wet or dry. The windows may be hung from the bottom, as indicated at E in Fig. 12, or they may be pivoted in the middle, or preferably a few inches above the middle, as shown at F in Fig. 14.




*One-Story Mill Building.— Fig. 5.—Section of One Span.—Scale, $\frac{3}{32}$ Inch to the Foot.*

Some of Mr. Atkinson's running comments on construction of this kind will be of interest: If attention is given to the thickness of the floor, and the monitor or lantern with vertical windows be placed overhead in place of the ordinary slanting skylights, a one-story factory is warmer in winter and is much better ventilated than a high building. The floor planks are laid flat on the timbers and are grooved and splined together. Three inches thick is specified on the narrow bays and 4 inches thick on the wide bays. Over this mortar or asbestos paper is placed, and then the top floor of 1-inch lumber. No sheeting is permitted upon the under side of timbers, so as to make a hollow floor. A hollow floor is an abomination in the estimation of insurance men.

The slow-burning construction here illustrated is being adopted in many other buildings besides factories. The Medical School Building and the Laboratory of the Institute of Technology, in Boston, are of this character. The new Science Building, at Amherst, Mass., is another example, while a commercial block covering a whole square in Chicago also embodies these features. The new Insane Hospitals in Indiana also employ it. In the estimation of Mr. Atkinson the advantages are so great that dwelling-houses will ultimately be built in this manner. The greatest obstacle at present is the lack of a convenient and economical means of stopping the passage of sound through the solid floors. In Mr. Atkinson's estimation a solid plank roof, grooved and splined, should be put on every building, whether flat or pitched. It is dry and impervious to heat and cold. On a pitched roof he recommends that all shingles be laid over mortar. He would sheath solid on the inside of the roof-boards between rafters set 5 feet apart. With this construction the roof would cease to be the sham that it now is in many cases. If plastering is desired he would have it laid solid between the roof timbers, using dovetailed laths. He is opposed to the "crazy-roof style" of architecture, and if we mistake not he originated the term which so happily illustrates a phase of modern building.

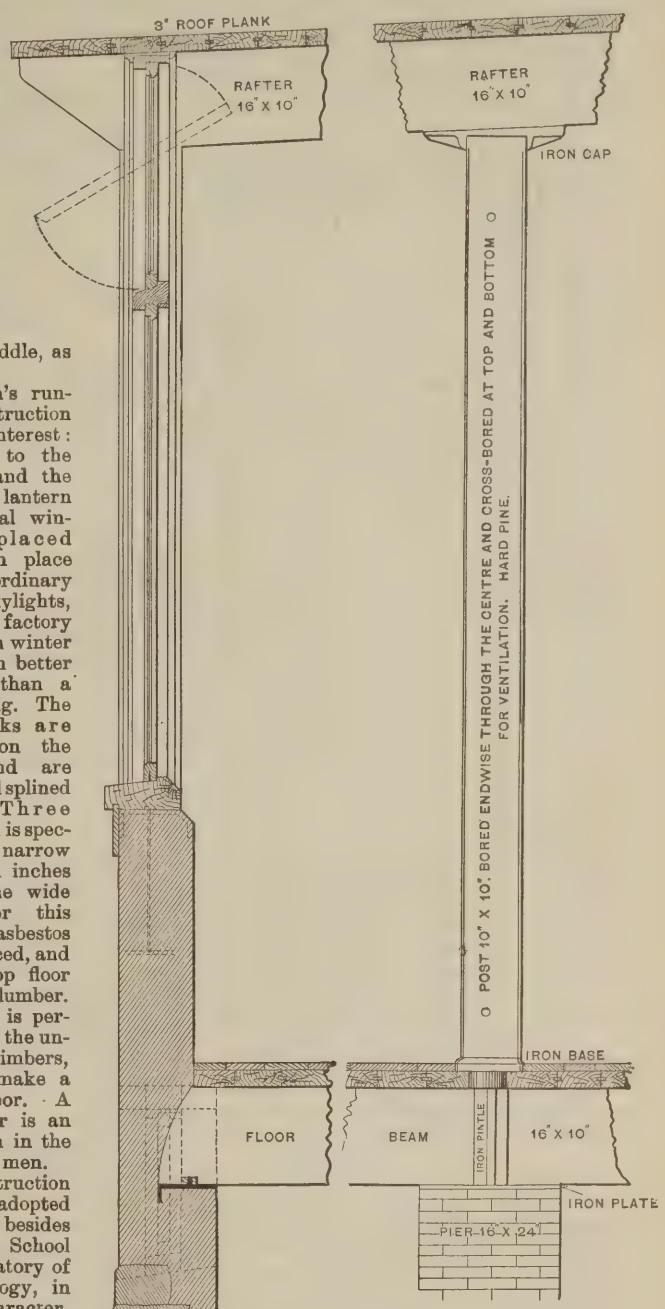



*Fig. 6.—Vertical Section of Wall and Inside Post.—Scale, ⅜ Inch to the Foot.*

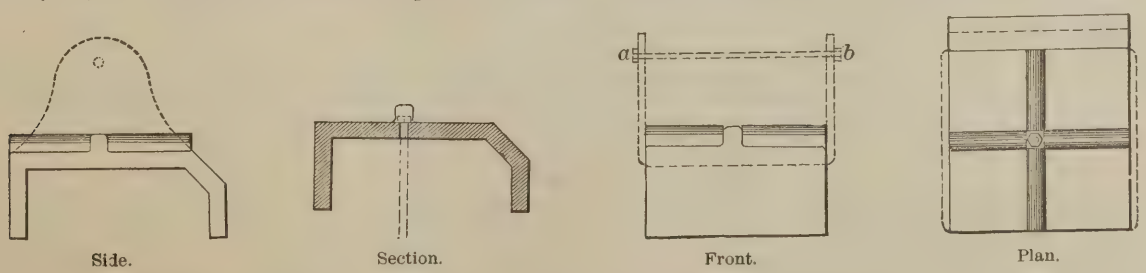
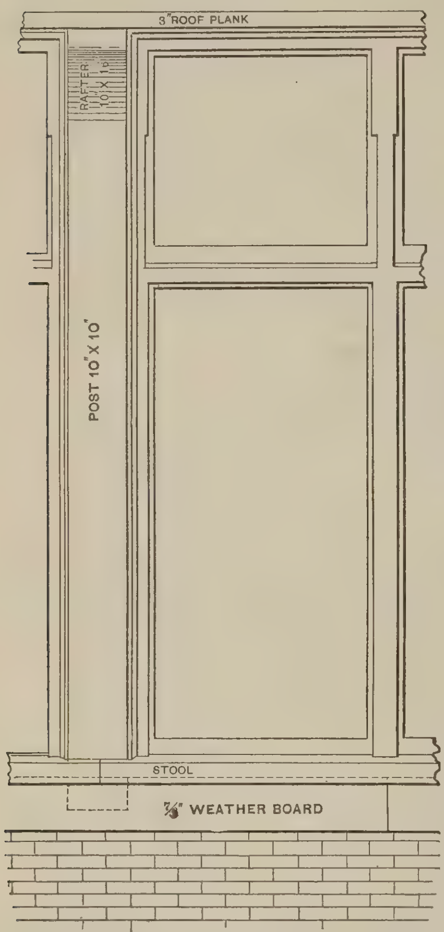



*Fig. 7.—Details of Base-Plate Below Posts of Window Frames.*

In the course of his remarks Mr. Atkinson submitted a special report made by his company on outside coverings for flat roofs, from which we glean a number of items that will be of interest in this connection. It often happens that those who have used tin roofs desire to change to composition roofs, and those in turn who are




*One-Story Mill Building.—Fig. 8.—Elevation of Window.—Scale, ⅜ Inch to Foot.*

using composition roofs desire to change to tin. Others who have employed both materials desire something else. The report points out that the fault which has led to the distrust of the substance previously used is generally found in the bad construction of the roof proper. Every kind of covering laid over thin boards unmatched or formed of single plank of any thickness is liable to be impaired by the shrinking or twisting of the material of the roof or from the springing of the joists or timber if the roof is not properly sustained. Felt or composition coverings or tin are sure to come into disrepute if false economy prevails in their application and materials

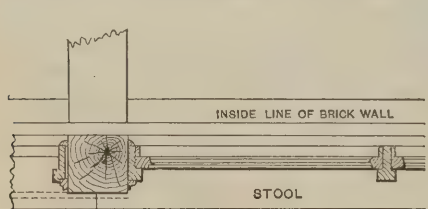



*Fig. 9.—Plan of Window.—Scale, ⅜ Inch to the Foot.*

of poor quality are made use of. A frequent cause of injury to the outer roof covering is also found in the penetration of moisture through the cracks of the roof, which condenses upon the under side of the outer covering. This is one of the most frequent causes of the destruction of tin. In formulating rules by which to obtain tight roofs and secure durability to the outer covering the report continues: The first requirement is that the timbers shall be of sufficient size to keep in place without serious deflection. They must not exceed 25 feet span, and must be sustained either by a sufficient number of posts or else by

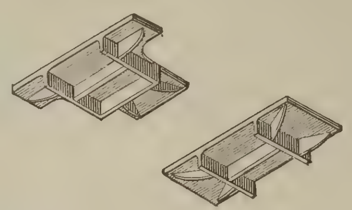


*Fig. 10.—Detail of Caps at A and B on Posts in Monitor.*

well-constructed trusses. The next requirement is that the planks shall be not less than 2 inches thick, while 3 inches is very much preferred. The plank is to be grooved and splined, planed to uniform thickness, and thoroughly seasoned. Air space in the substance of the roof is not recommended, even though it be provided in such a way as to be unobjectionable on account of fire. The circular says that composition roofs covered with gravel placed over a properly-constructed roof of timber and plank have, on the whole, proved to be the most satisfactory roof coverings. The specification of such a roof is as follows: Place upon the roof plank three layers of roofing felt parallel with the eaves, and continue by lapping one additional layer two-thirds upon the preceding one. Repeat this until the whole surface of the roof is covered. The felt being properly secured in place is to be coated with a melted composition, and over this two additional layers of felt are to be placed. Secure the felt at intervals upon the surface, also at the eaves and about the chimneys, and then spread upon this surface a good body of the melted composition, and cover with gravel in sufficient quantity to thoroughly incorporate the same with the composition. No composition should be used until three sheets of the felt in thickness have been laid. This allows greater freedom to the felt, which is not liable to become cemented to the plank, and is not, therefore, effected by the expansion or

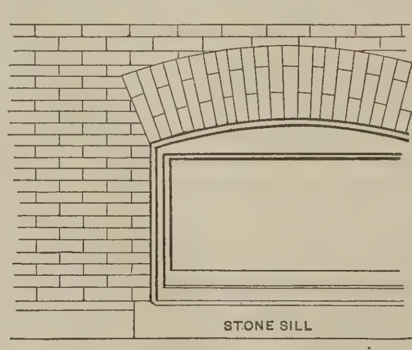



*Fig. 11.—Basement Window.—Scale, ⅜ Inch to the Foot.*

contraction of the same. This construction of a gravel roof will strike many of our readers with surprise, differing as it does very materially from that in common use. The extreme durability of such a roof, however, is attested by long experience in the East, particularly in factory construction, which is sufficient to recommend it to use. Composition rcofs as very generally laid throughout the country are cheap and mean, and are a constant source of reproach to those who lay them and to the building on which they are employed.

This at best is an inadequate account of the radical innovations on common methods of construction which a certain class of advanced insurance men are making at the present time. Mr. Atkinson and his associates base their recommendatiocs upon the real economy of the methods proposed, and the great success of the insurance company whose business is restricted to risks upon buildings which conform to these conditions is a strong argument in their favor. The subject is one of great interest and importance to architects and builders everywhere. The next few years are likely to see an important change in ideas of building construction, promoted and encouraged as it will be by insurance men who are tired of writing policies upon buildings which are almost sure to be destroyed by fire.

## House Decoration.

A writer in the *Painter's Magazine* describes the decorations of a country house, built in the old Colonial style, which had fallen into the possession of an artist, who.

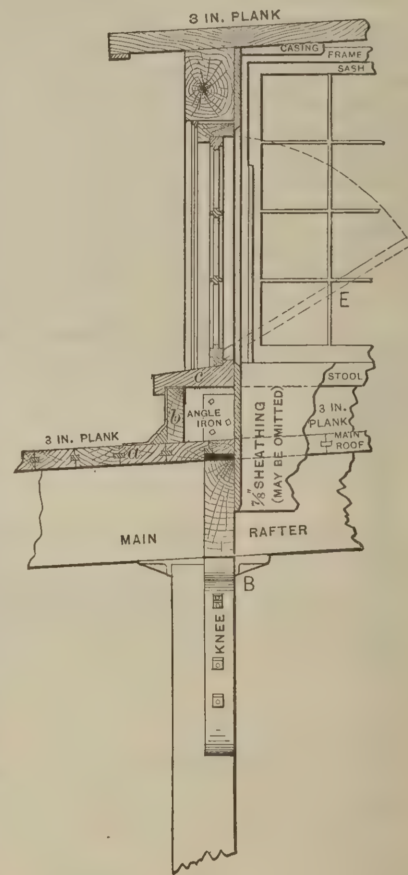



*Fig. 12.—Vertical Section Through Monitor.—Scale, ⅜ Inch to the Foot.*

in spite of lack of success as a delineator of landscapes and portraits, has succeeded in making his mark as a house-decorator. The leisure time of this artist had been spent in beautifying his residence as far as was possible with color. The writer in our contemporary states that, while in some instances he had produced *bizarre* effects, on the whole he had materially added to the attractiveness of the house. The following description will give our readers an idea of the building in question:

The general surface of the exterior is a light green, with window borders, piazzas and columns painted blue, and the carvings of gables, the columns of the piazzas and the

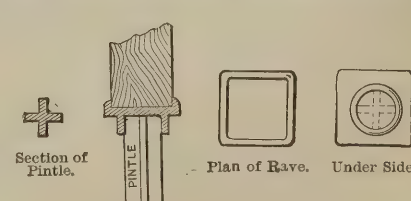
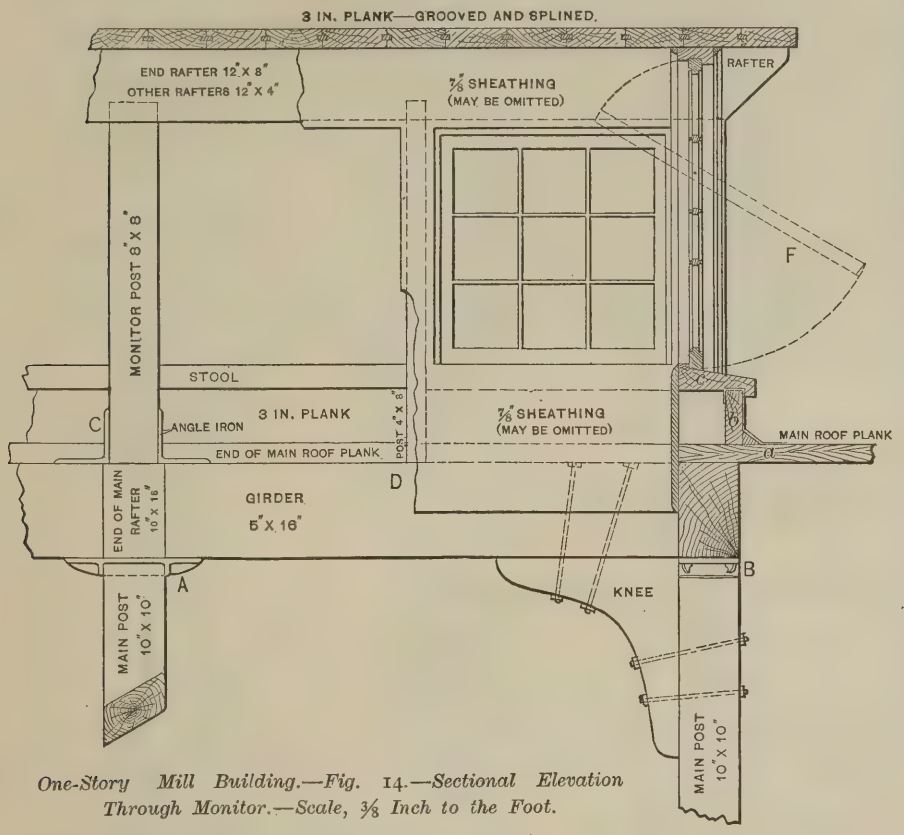



*Fig. 13.—Pintle and Base of Main Posts.—Scale, ⅜ Inch to the Foot.*

tiled hoods over the upper windows orange and vermilion. All the colors named are repeated on pinnacles on the roof. The walls of the square hall, with doors on each side and a recessed stairway hidden by a *portière* in front, are adorned with a series of pilasters in porphyry hue, their capitals

picked out on gold, the interspaces having palm-trees molded in the plaster and colored after nature. The ground is of a light roseate tint. The doors are of a stained satin-wood, with moldings in orange and blue. In the parlor, the architectural woodwork




*One-Story Mill Building.—Fig. 14.—Sectional Elevation Through Monitor.—Scale, ⅜ Inch to the Foot.*

of which is cherry, the curtains are of Surah silk of a greenish gold tint. The wall is tinted two-thirds of the way up with a delicate light-brown hue, studded here and there with fanciful figures in gold and vermilion. The remaining space is covered with classic scroll figures in light pink, gold and blue. The frieze is a series of panels in Arabesque style, in red, green and gold. The ceiling is tinted with light pink and has a border of plain lines of vivid vermilion.

A prominent feature of this room is the painting of the wide, expansive door separating the parlor from the sitting-room. This door is decorated with flowering plants that rise upward from the lower panels, the white and tinted buds and leaves resting against the olive ground. The stems and leaves are touched off with bronze powder, as though reflecting sunlight. Wavy lines in green, sketchily traced, and which any painter might produce, represent below a greensward. The boldly projecting and grooved framework of this broad arched door, with continuous grooved lines, alternately concave and convex, is radiant with prismatic hues in their natural order, affording an exquisite play of color. What is to be noticed is that in this, as well as in other apartments, many colors that theoretically are deemed discordant are introduced

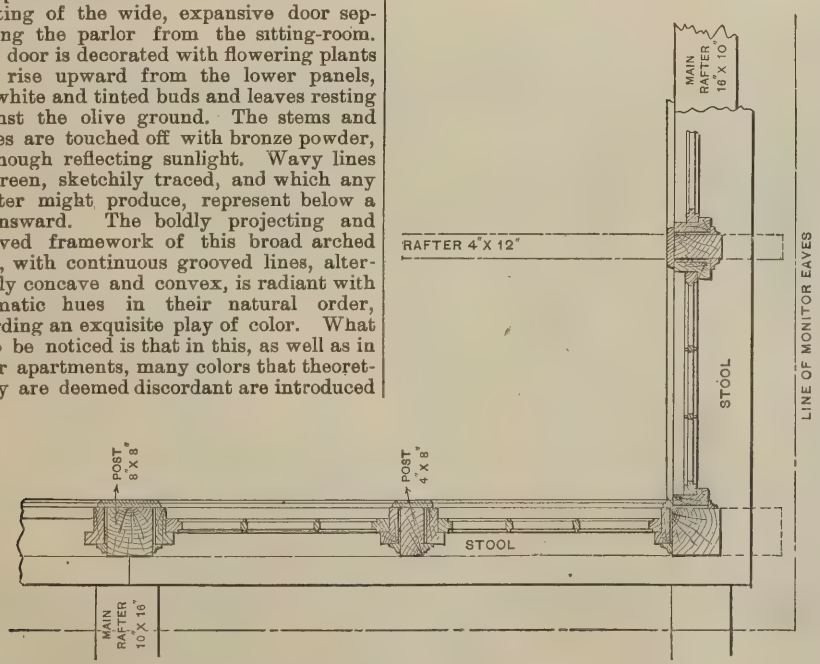



*Fig. 15.—Plan of Monitor Construction.—Scale, ⅜ Inch to the Foot.*

in positions and with connecting media of complementary colors that render them decidedly pleasing. The positive and strong colors employed throughout the house are positively numerous, yet there appear no glaring effects, showing that there is nothing in color dissonant to the genius of art. Have we not in house-decoration too much of quiet tone, seeing what sensational pleasures strong colors and vivid contrasts can impart?

The sitting-room in this house presents a restful appearance, and yet abounds with bright, delicious hues. Warm brown and red and yellow hues blend with vermilion and green on woodwork and walls. The painted border of the floor, which the carpet leaves exposed, responds in alternate squares of brilliant colors. The walls for half their hight are tinted gray, set with golden stars. Then comes a broad band of pink shell hue, crossed with lines of gold, on which are scattered gilded wheels picked out in vermilion. Above this is a band of light green, gold-faced, with scroll forms in vermilion, and above this the lower band is repeated. The frieze is a paper pattern of flower forms which have been painted over so as to vary their appearance. The ceiling shows a ground of light-pink hue; the border is a series of Moresque designs, with scolloped edging in red and green, on ground of cerulean blue. In the center of each band is an interposed square, half projecting on the pink ground, the frame being yellow, and filled in with a spray of roses. The centerpiece of ceiling is a square of overlapping stripes of dead gold, filled in with a circle having red center and outer rings of alternate blue and gold. Slender springs, with tiny leaves and flowers of the lightest possible tints of green and blue, are massed on each side of this square, while to meet them, as it were, stretch branchless stems adorned with small birds in brilliant plumage and butterflies with their many varied hues. The corners of the ceiling band from which they spring are rounded with segments of a circle in variously-shaped colored dots. Now, here is a ceiling which one can look at with enjoyment, the eye wandering from one tint to another, and constituting a well-composed design. The whole effect is rich and unpretentious.

## Modern Architecture.

The opinions of a prominent New York architect on questions of style and the future developments of architecture in this country are reported in one of the newspapers, as follows:

Architectural taste has improved very much in America within the past 20 years. It is not so much the lavish expenditure on buildings as the pure and simple structural qualities that are desired. The *façade* must be free from too much ornamentation—not too severe in outline, but still just a strong touch of the classical to make it decided and full of expression. Now and then a rich man, with too much money, desires a house

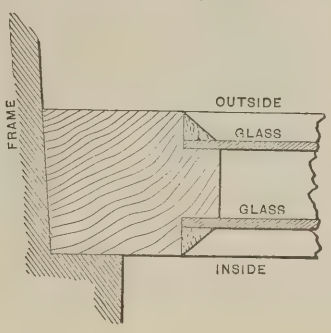
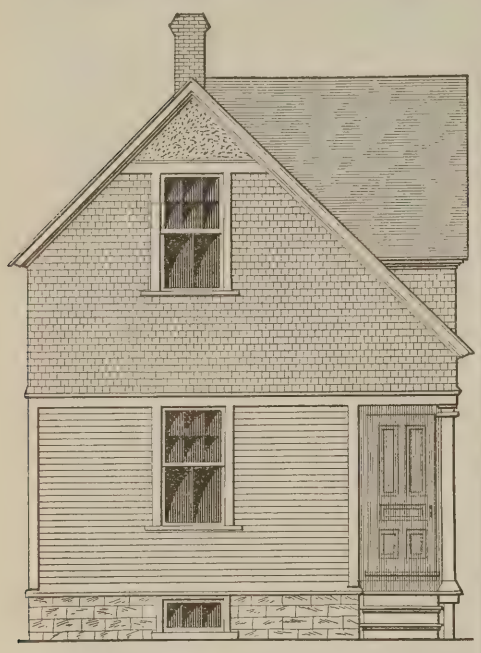



*Fig 16.—Section Through Frame, Showing Beveling of Sash, ⅜ Full Size.*

constructed so full of gables and superflucus angles that it is difficult to tell whether it belongs to the Renaissance period or is a dream of Chinese pagoda and Saracenic style combined. These instances, though, are very rare. The improved art of photography, the great travel of American tourists in Europe, and improved methods of education, have elevated and refined the American taste in architecture and made it possible to expect at some future period an American Renaissance. Up to 25 years ago the old Colonial or Queen Anne style prevailed generally. Then began a strange period in the history of American architecture. It was not a transition exactly, but a change on the old, with many weird and fantastic innovations. It was Griffith Thomas' exuberant American Renaissance. The *façade* of a building was expressionless, yet full of salient features, jumbled here and there in most admired disorder. It might have been properly called the millionaire's hobby style to squander wealth. A reaction is happily going on now which will bury in oblivion a style so expressive of waste, yet so devoid of taste. A few of these fantastic edifices now stand in different parts of our city as eyesores to the plain and neat structures around them. In a few years they will disappear and give place to the present refined taste, which is manifesting itself by the erection of fine buildings.

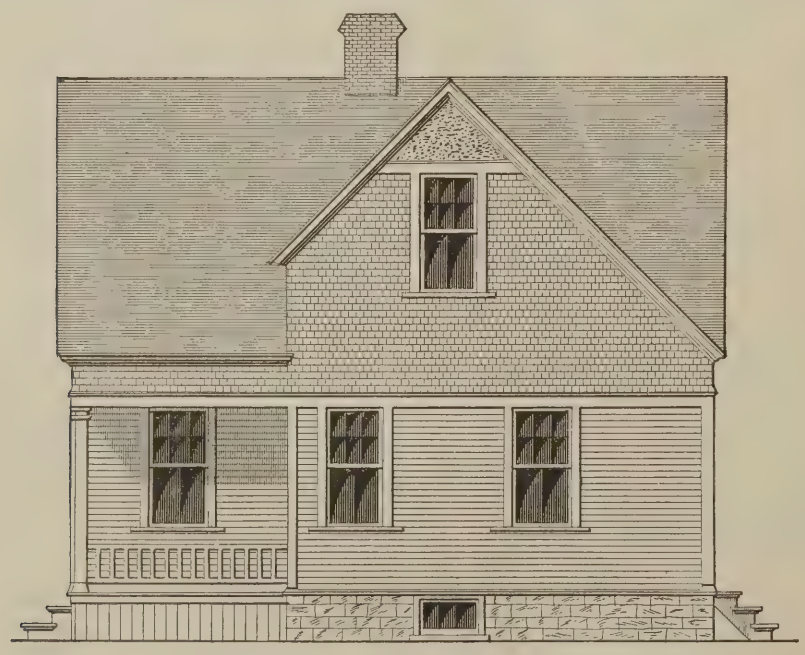
Queen Anne style is decidedly on the wane. Whatever is good in it will survive; what is bad will be dropped. This style is frequently overdone, and is permitted to run

into wild and meaningless extravagances which mar simplicity and degrade the very beauty that exists in that style. This fact, in my opinion, has done more to create a reaction against that style than improved



*Frame Cattage,—Front Elevation.—Scale, ⅛ Inch to the Foot.*

taste. The name of Queen Anne style covers a great deal of architecture. It is wide in its range and often trespasses upon other styles. Yet it remains distinct, and has an influence impossible to discard in a decade or two. But that it has a general feeling of weariness about it cannot be disputed, and this, perhaps as much as anything else, acts as a potent factor in its decadence. In defining the present tendency of architectural style in America, first I can say I believe a transition period exists at present, and that this period is one of great uncertainty, with a tendency toward Italian Renaissance. Types of this style of building are found in Bologna, Italy, built of molded bricks and terra-cotta work. These buildings do not in their construction permit of wild vagaries, but of decided expressions of the best styles



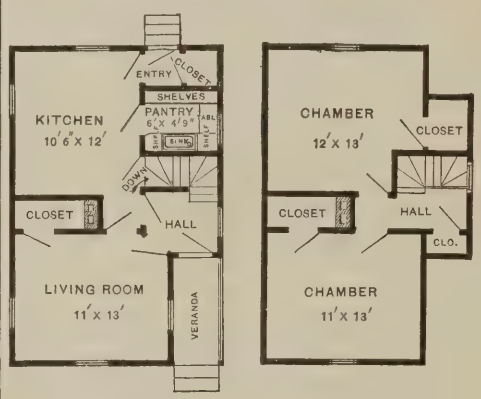
*Side Elevation.—Scale, ⅛ Inch to the Foot.*

in Italian Renaissance. In this style, too, greater effects in neat simplicity can be obtained than in that of the Queen Anne. Then it also permits of greater scope for orignality, and originality is much more desired now than formerly. The idea among the wealthy and cultivated is to combine taste and usefulness without throwing away money. Occasionally the mediæval style is seen, and when not overdone is capable of fine results. The mediæval and Gothic are nearly the same.

Twenty years ago all the cottages and fine farmhouses were covered with a masard roof. To-day you rarely ever see one with a mansard roof. Normandy farmhouses are popular now, with round extinguisher roofs. Cottages are generally half English and half French in style, and present quite a picturesque appearance. The same general improvement in architectural tone is felt in the style of farmhouses and cottages as in private or public buildings. For a time English taste ran riot in Queen Anne's style, but to-day people are tired of it. It was the nightmare of architectural beauty, and the reawakening has now commenced in dead earnest. As a general rule no good mediæval or Gothic styles are attempted, except in churches. It is a difficult style to do justice to, and for that reason hardly any of the Gothic have been built.

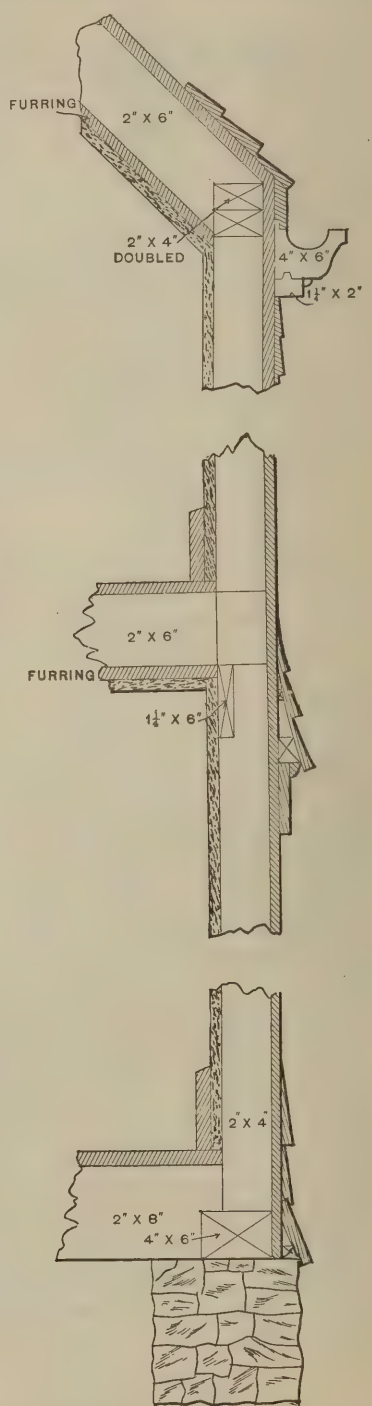
## Frame Cottage.

In the accompanying study in cottage planning the author, Mr. Frank L. Smith, of Boston Mass., states that he has endeav-




*Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.*

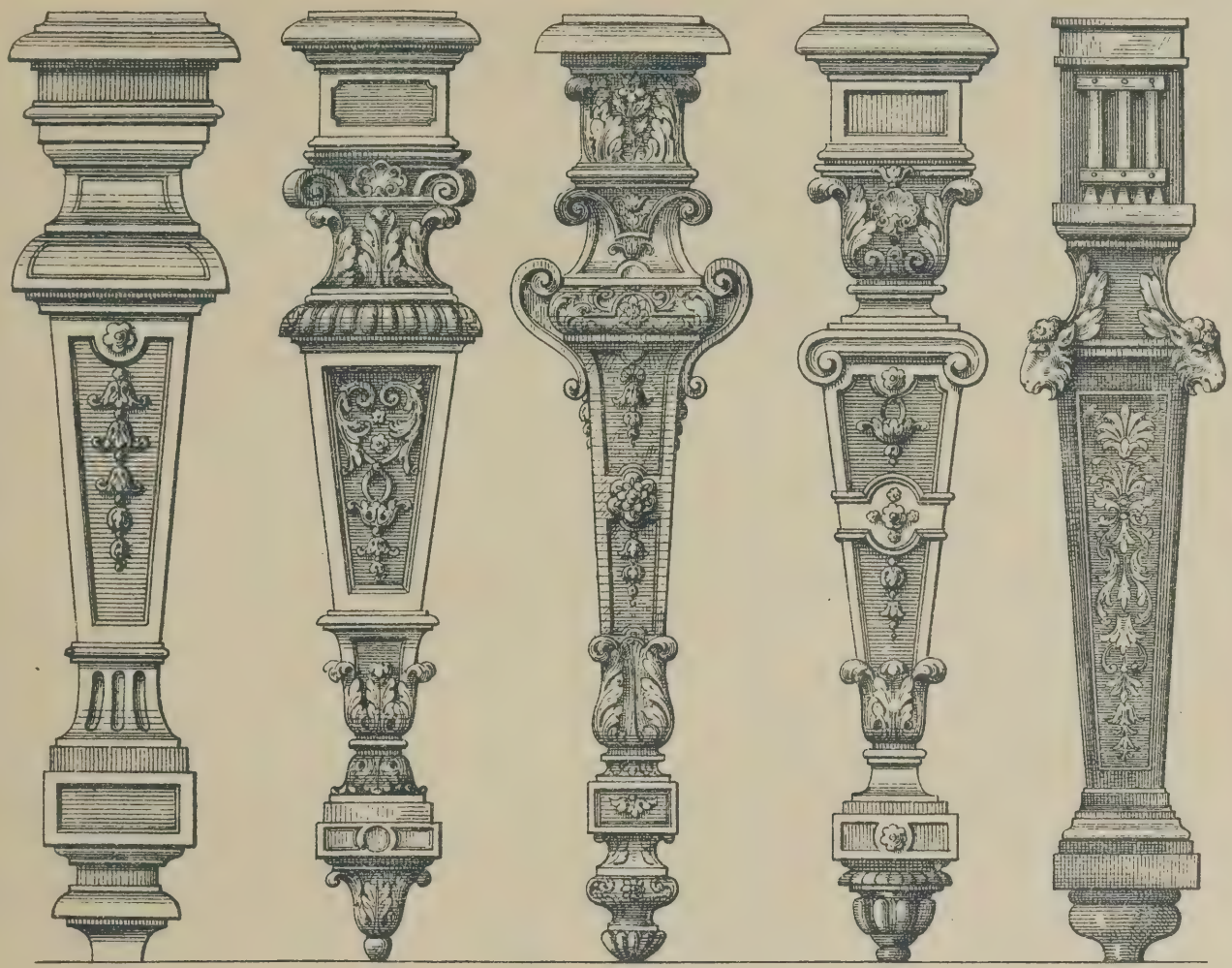
ored to keep three essential points prominently in mind—convenience of arrangement, compactness, and economy of construction. One who proposes to build with, say, only $800 or $1000 to spend, must content himself with few rooms, and those of necessity must be of moderate size. The kitchen must serve as dining-room as well. To this end, in this case the chimney has been placed entirely out of the living-rooms and within a closet, and the sink has found a convenient place in the pantry. By these and other features, the author asserts, every inch of space is made available for the purpose in view. A living or sitting room is provided, connecting with kitchen and hall, and it is of a character to be elevated to the dignity of parlor, should the householder so elect. Large closets are numerous throughout the building and have been conveniently located. In its general features the building is 1½ stories in hight. The arrangement is such that the rooms on the second floor are nearly as desirable as though they were full studded. They are 4 feet 6 inches at the

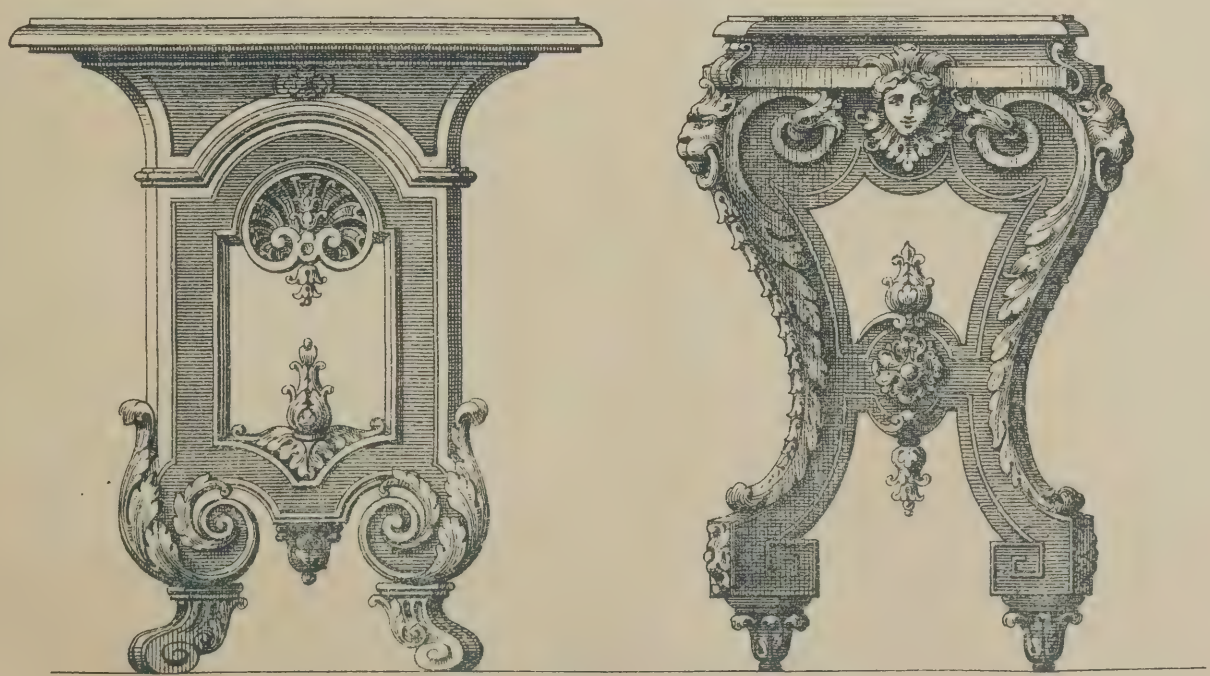



*Section Through Wall.—Scale, ¾ Inch to the Foot.*

lowest point, and there is a little unavailable space in the roof. The finish throughout is of the plainest and simplest character. The exterior has been considered with reference to economical construction and tasty appearance. The three gables are similar in character. The piazza leading to the front is composed of the simplest parts, the shingling is plain and the clapboarding of the ordinary character. A bit of plaster-work is used at the top of each gable for the sake of effect. Judicious painting would make of this a very attractive house.

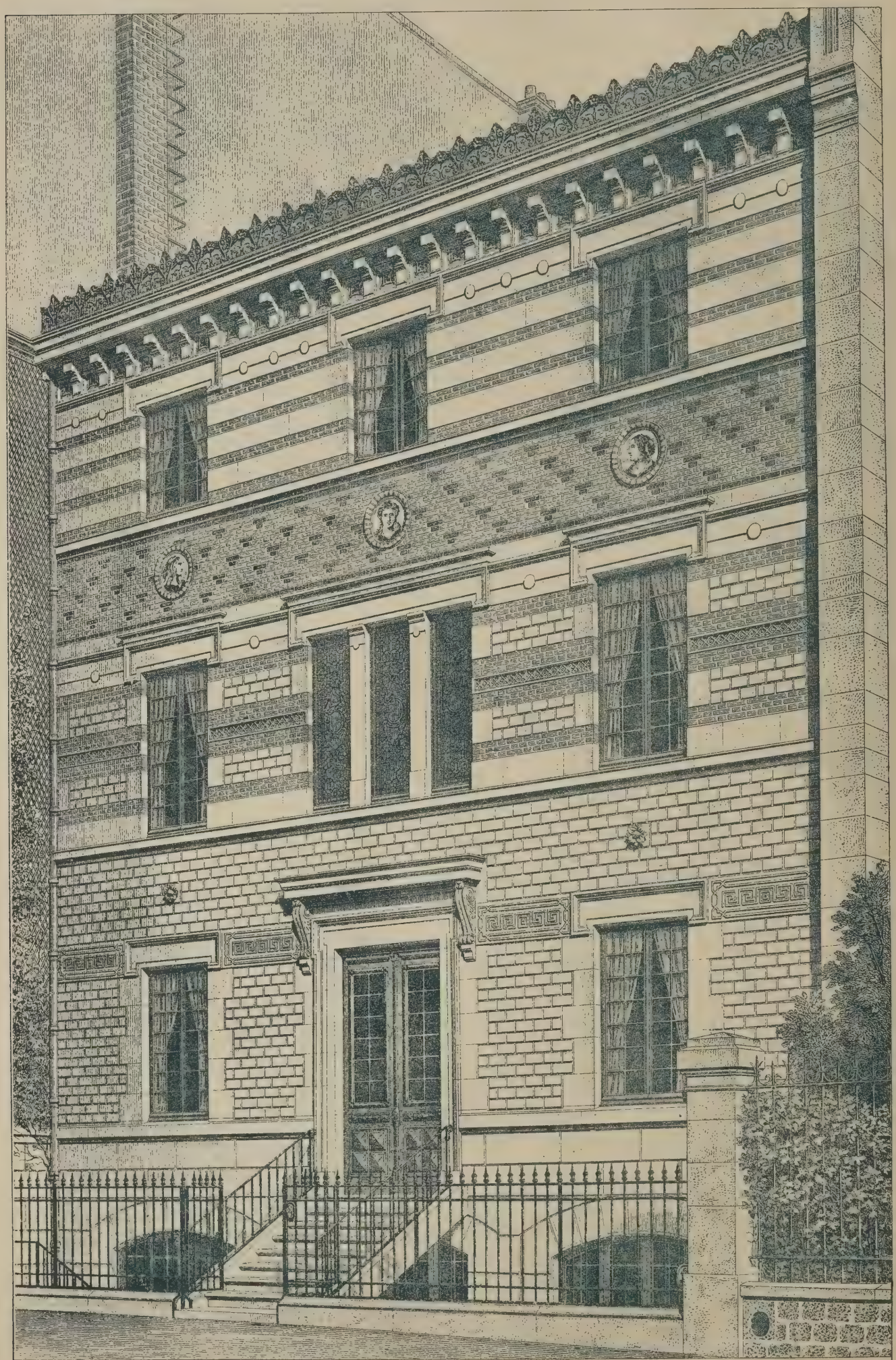
PLATE V.





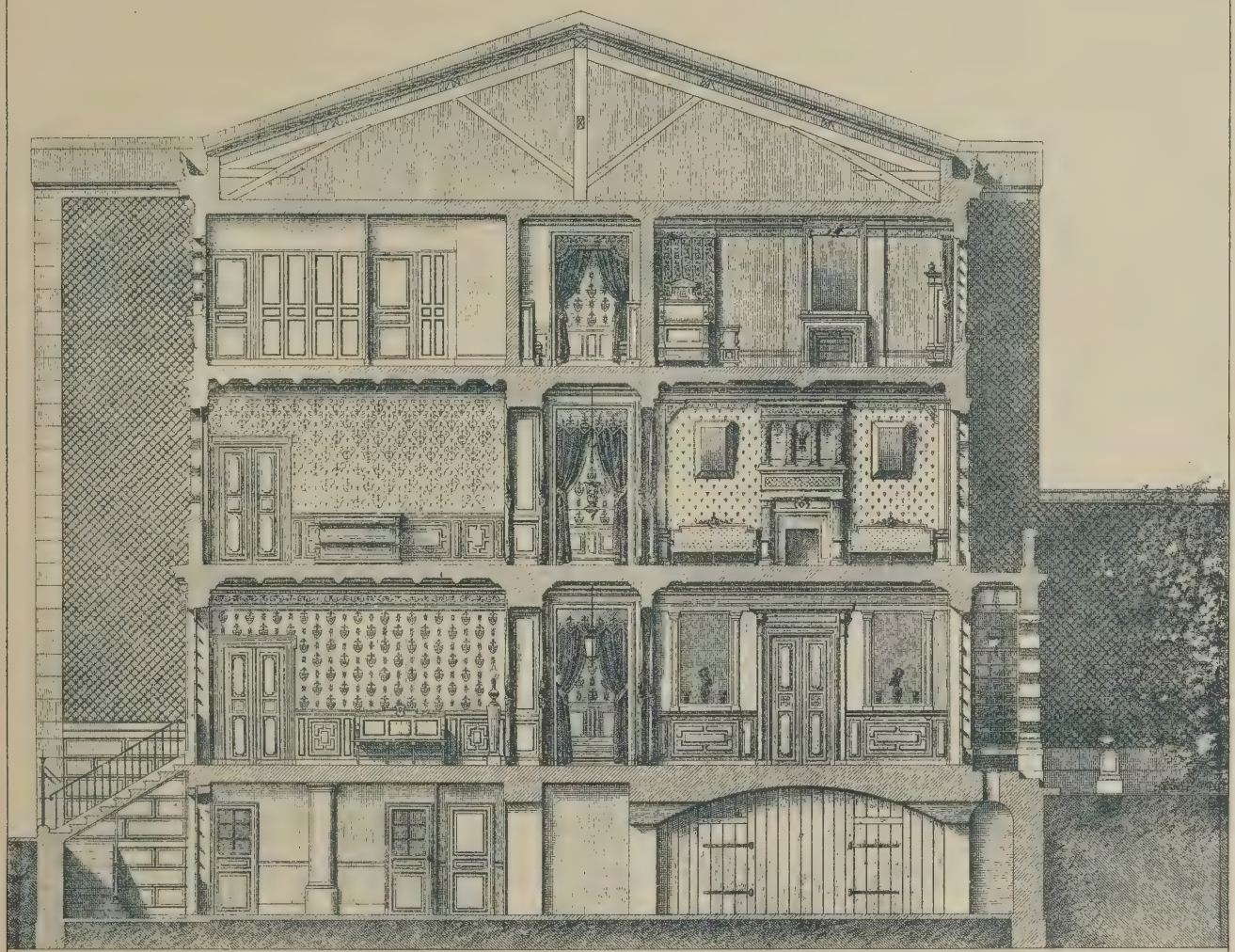
PARTS OF FURNITURE IN THE STYLE OF LOUIS XIV.

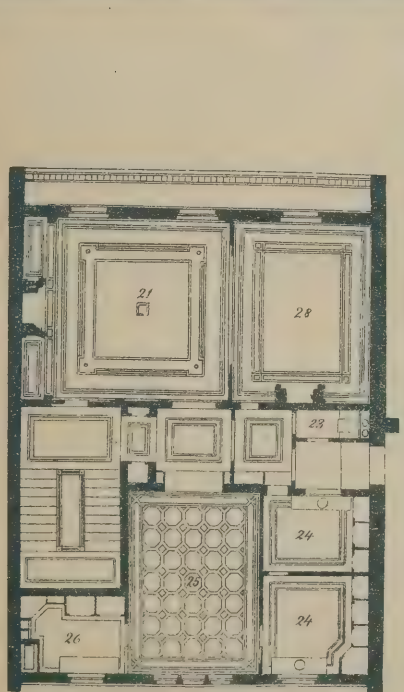
PLATE VI.



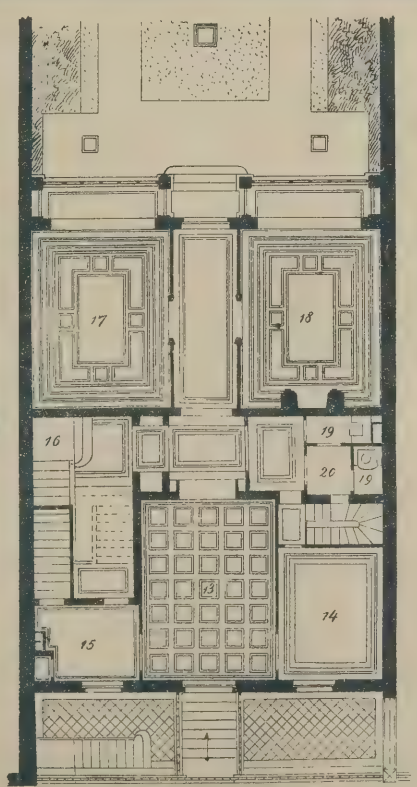
RESIDENCE OF ACHILLE HERMANT, ARCHITECT, PARIS.

PLATE VII.

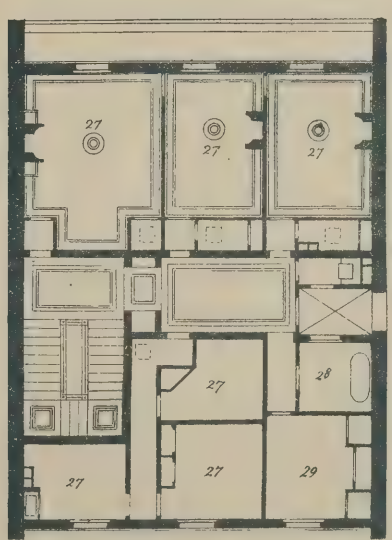





First Floor.



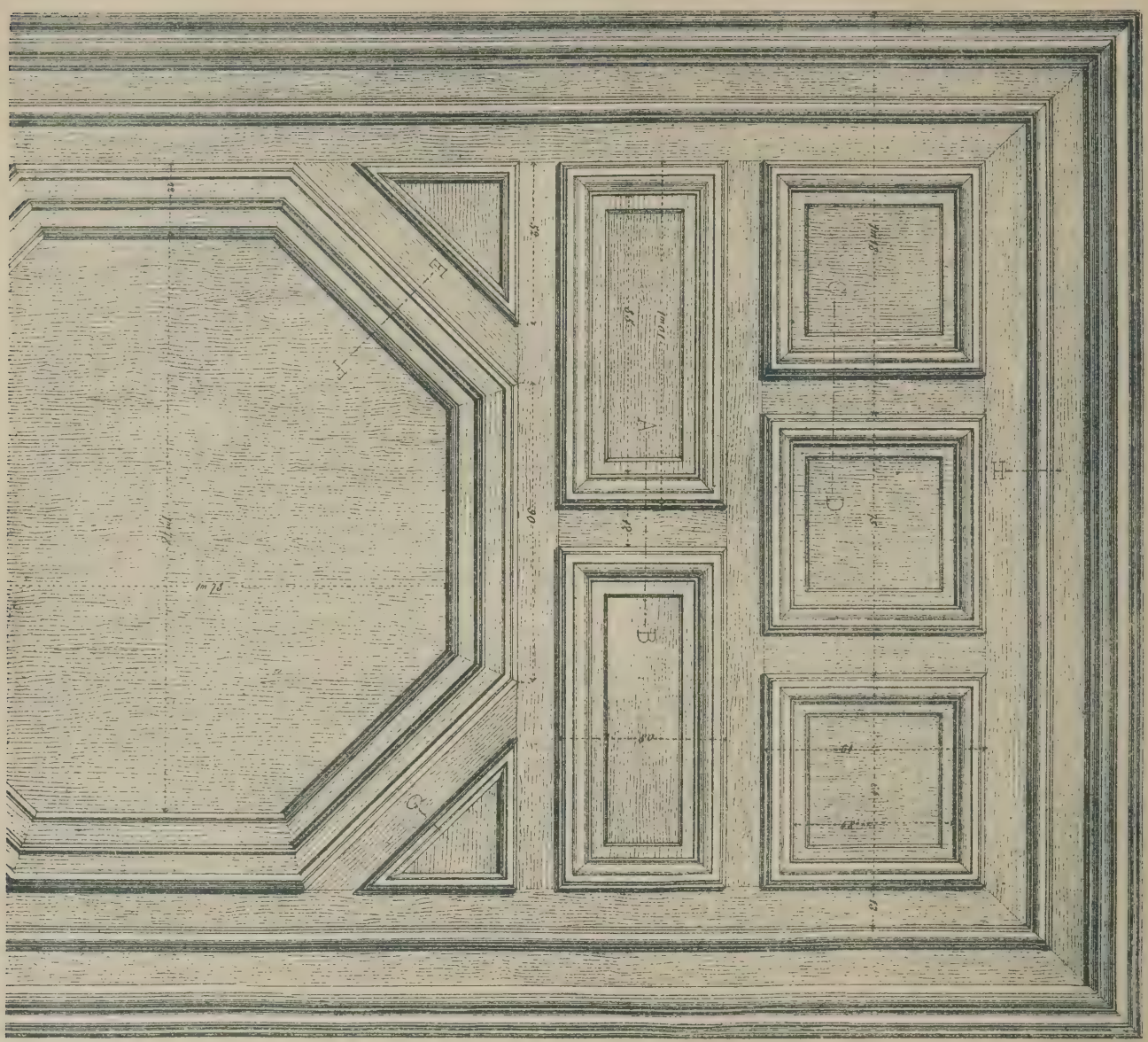

Ground Floor.

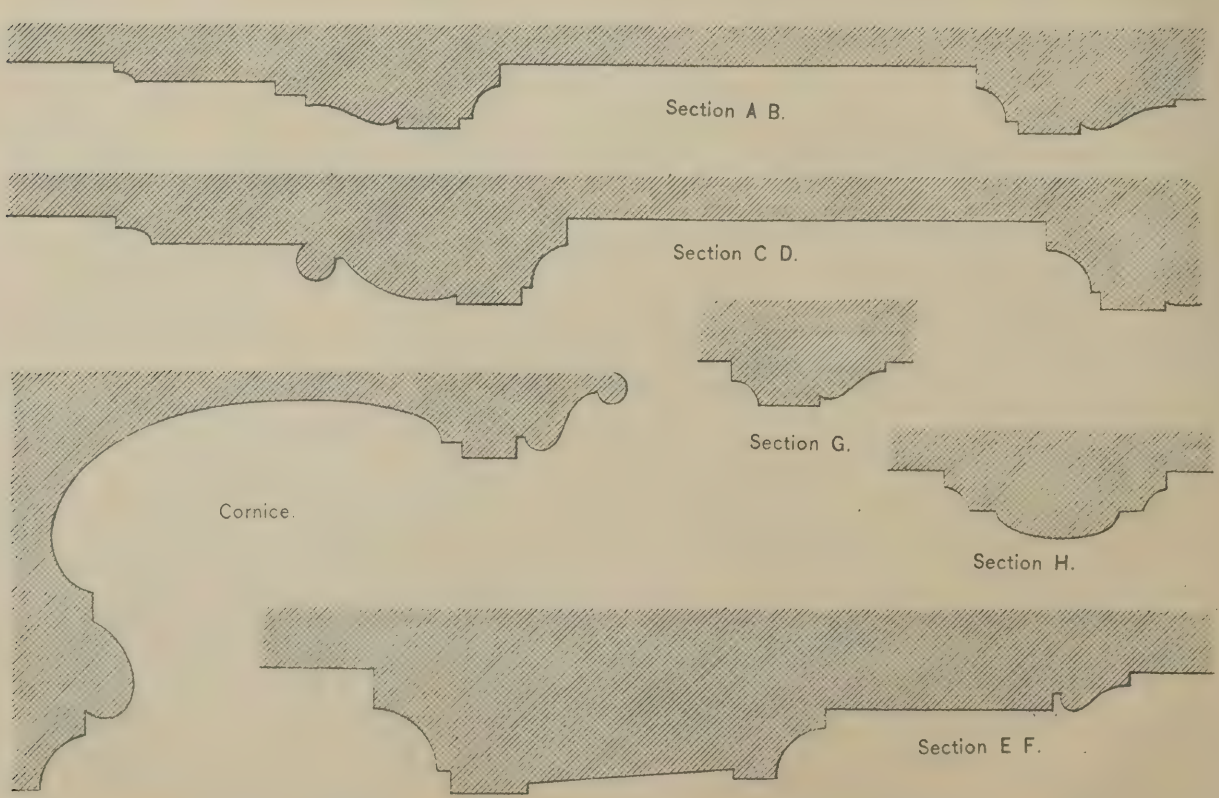



Second Floor.

VERTICAL SECTION AND FLOOR PLANS, A. HERMANT'S RESIDENCE.

PLATE VIII.



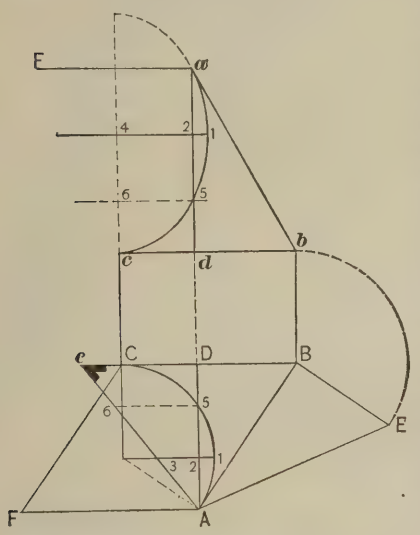




DESIGN FOR CEILING IN OAK. L. BEAUREGARD, ARCHITECT.

# CORRESPONDENCE.

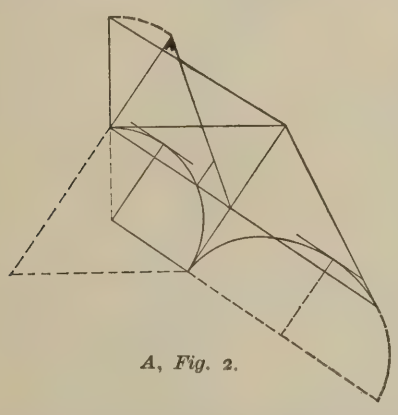
### Questions in Stair-Building.

*From* S. B., *New Brunswick, N. J.*—I have read the replies to my question on hand-railings in the issue of *Carpentry and Building* for November, and am much benefited thereby. As you invite me to follow up the subject, in case I need to do so, I venture to ask additional questions. In this correspondence I do not propose a lot of questions and then idly await your reply, but in the interval I study the problems myself and try to solve them. In many cases I succeed in




*Questions in Stair-Building.—A, Fig.* 1.

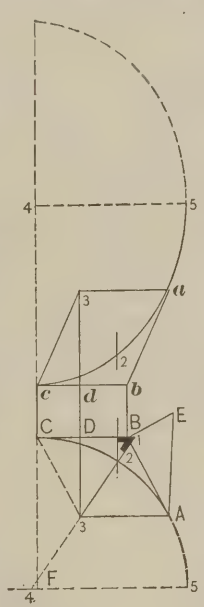
doing so. Then when your reply comes it either proves my solution to be correct or else shows where I am in error. I am almost ashamed to admit that I have again failed to grasp your meaning in reference to shaping a wreath, in answer to No. 8 in the November number, yet I have often shaped wreaths of this kind, and think they were well done. I may have done the work as you direct, but nevertheless I do not understand how to draw a level line across the butt joint at right angles to the plumb bevel and cut a new face plumb up from this bevel line. However, you need not go to the



*A, Fig.* 2.

trouble of giving further instruction on that point. I do not ask questions in the sense of criticising the method presented in *Carpentry and Building*, or finding fault with it. I make these inquiries only with a desire to add to my knowledge of the subject and to learn how to perform certain operations by more than one method. I should like to propose some questions concerning wreaths over portions of ellipses in plan, which, I think, differ somewhat in some points from those for circles. However, inasmuch as I have already occupied so much of your attention and space, I shall forego that pleasure. I now inclose diagrams, with some questions, to which I shall be glad to have you give attention if convenient. I do not ask to be placed ahead of other correspondents, but if replies to these questions can be given soon you will confer a great favor by so doing. The questions and diagrams to which I refer are as follows:

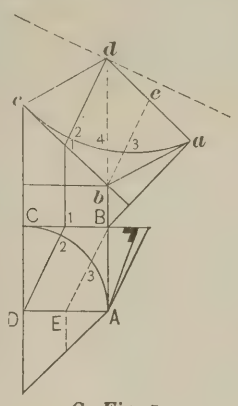
*A.* Fig. 1 is drawn after Article 10, June, 1881, page 109. The guiding point at 1 being found in the same way as shown by the full lines, while the point at 5, shown by dotted lines, is found as at Article 21, August, 1882, page 145 (after which Fig. 2 is drawn, but of same size and pitch as Fig. 1), the result (point 5) seems to be the same in each figure, and is a good point to use in drawing the elevated center line. The lines F *a*, 6 5 and *c b* are all level lines and occur over corresponding lines on the plan, but no one of them is the minor axis of the ellipse, and will not give the place where the pattern should be the width of the rail, but I think that the line 4 1 is half-minor axis and 4 *c* is half-major axis of the required elliptic curve, on which, if so desired, the curve could be drawn by string and pencil or trammel, the quarter-ellipse 1 *c* so produced covering the quarter-circle C 1 on plan. If this is so, the narrowest part of pattern would be at 1, with the rail parallel to the face of the plank and its center at center of plank. Therefore, while point 5 is the best guide in drawing the center line by a rod, point 1 is where pattern should be made the width of rail and draw form of face-mold. Yet at article 21 you give 5 as that place, and then say: "In theory the narrowest part of this pattern should be, &c." Why do theory and practice in this case differ so much? Would it not be as well to make the pattern as theory says it should be, and as it is made at Article 10? Are my statements contained in the foregoing, as to the axis of the ellipse, the points obtained by the two methods, &c., correct or not?



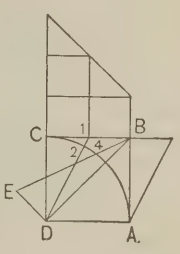

*B, Fig.* 1.

*B.* Fig. 1 is drawn after Fig. 15, on page 157, August, 1885, where you show how to find a point to use in bending the rod. This certainly gives a good point, so far as the center line is concerned, but it would not do to make the pattern the width of rail at this place for the reason you give. If it was desired to draw the curves by a trammel, we would have to go beyond the portion of circle used and find the two axes as shown by the dotted lines in my diagram, which I did in this way: The bevel line extended to 4 gave 1 4, or half long diameter; extend F C *c* indefinitely and make 4 *c* equal 1 4 on plan; draw 4 5 at right angles to 4 *c* and equal to 4 5 of plan, thus obtaining half of short diameter. It is now easy to draw the curves by string or trammel, making greatest width of rail at 5. This I think shows your method to be the most convenient way and to be preferred, but I think some rule is needed by which to determine the width of pattern at the points given, or on the measuring lines found by your method, as many of these lines do not coincide with the minor axis, and the width of the pattern at these places seems to be determined only by guess. Can you supply this want? This applies not only to this problem, but also to others when the measuring line is formed by your method and does not correspond with the minor axis. Is my drawing and the statements concerning it correct?

*C* (Figs. 1, 2, 3, 4). In these diagrams the quarter-circles in plan are of the same radius in each case with the same pitches over them. Fig. 1 is drawn by the method as published by you, the dotted level lines being drawn to corner of tangents, giving point 3 nearer to center of the curve than does the full lines D 1 and *d* 1, which are drawn as shown by you at Fig. 9 (Answer 6, August 1885, page 156), and coincides with line D 1 of Figs. 2 and 3, which are drawn by Mr. Monckton's method; these lines give the minor axis of ellipse and place where pattern is to be made the width of rail, &c., and is a very useful point to have in the pattern in some cases, but I would prefer to use the line drawn to corner of the tangents if some rule could be given by which the width of patterns at this place could be determined without too much trouble. Mr. Monckton's line D B, B E and *d b* does this, but is not a level line. Can this be done by your way on lines B E and *b e*, and which are level lines? The dotted line *b d*, Fig. 1, corresponds with B D, Fig. 3, and line *b e* of Fig. 3 with *b e* of Fig. 1. Fig. 4 is drawn by Mr. Riddell's method. The same result is reached by each of these methods. The diagrams are marked by letters and numbers that correspond, so that they are easily compared. I think you understand all of these methods so well that I need not explain them in detail. There seems to be a conflict of statements made by you in regard to the level line drawn by your method, which perhaps you can explain. At Answer 6, August, 1885, page 158, first column, 15th line from the bottom, you say: "By our method we obtain the point nearer the center of the curve. * * * A point is obtained in the curve where the rail lies parallel with the face of the plank, so that the thickness of the rail may be gauged in the center and from the face of the plank." This, as I understand it, refers, not to Fig. 9 in particular, but to the level lines in general, as shown in the several articles on stair-building published by you. Yet at Answer 3, November, 1885, page 216, you say: "In our series of articles the measuring line was generally drawn from * * *. Such a measuring line, except when it coincides with the minor axis, will not cross the pattern where the rail is parallel with the face of the plank." Please explain the difference in the above statements.

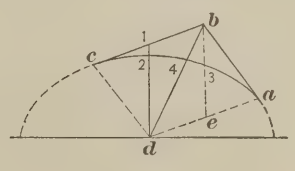



*C, Fig.* 1.




*C, Fig.* 2.

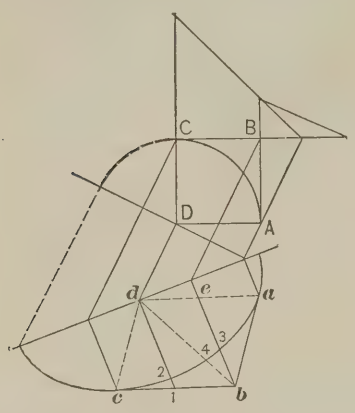
*D* (Figs. 1, 2 and 3). Where a rail covers a portion of a circle, and is continued either on a pitch or a level, the tangents on plan must be really tangent to the circle. But where a rail ends or terminates at a certain point, as in the case of a rake and level which raises to a newel cap, must the level tangent on plan be tangent to the circle at that point? As the rail is not continued beyond that point, could it not be drawn at any desired




*C, Fig.* 3.

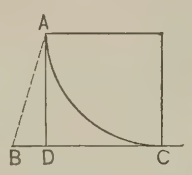
angle to raked tangent on plan, as shown by these diagrams? Here the lines B C are the raked tangents, tangent to curve at C. The lines A B are the level lines, but not tangent to the circle at A, while A D are level lines tangent to circle at A. I do not suppose that this way is to be recommended; it would probably make the work of obtaining the bevels, &c., more difficult than if the level lines were tangent to the circle. It seems that this would cause Figs. 1 and 2 to be practically problems of a rake and level

over more than a quarter-ellipse, and Fig. 3 to be one over less than a quarter-ellipse, thus giving us two bases for the bevel triangles. Is not this so? Still, the question arises, Could it not be done this way if so desired? In reference to this problem see Article 20, June, 1882, page 106, where it says: "Draw B I equal to two-thirds of a tread, and at any desired angle with C B."




*Questions in Stair-Building.—C, Fig.* 4.

I know that the curve at this plan is not circular, but could not the same thing be done when the curve is part of a circle—I mean by your method? Also see Mr. Monckton's work, plate 19, tangent O S, and plate 20, tangent K O. Here the curves are circular, but the method used is different. If tangents can be worked in this way, in what way, if any, could a point be found on the raked tangent from which to draw a level tangent so as to cause the wreath to raise or the cap to be of a certain or desired hight, more or less, as at B, Article 20, which causes the cap to be the hight of a long baluster. Could this be done without drawing an elevation, then the level line so found be used to draw a correct elevation of the balusters?

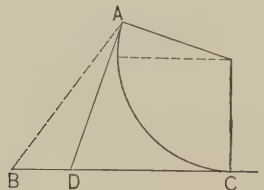



*D, Fig.* 1.

*Answer.—A.* The experiment and reasoning of "S. B." is correct, except where he refers to our "Article 21" as being inconsistent. He says that we give the point *f* in that drawing, corresponding with 5 of his diagram, Fig. 1, as being the place where the pattern should be made the width of the rail, &c.

He will see his mistake by referring to the article in question, where we say: "At *f* make the pattern about one-sixth wider than the rail." Also, further on: "In theory the narrowest part of the pattern should be over D, where the first quarter-circle ends." The theory referred to is that of taking a measure of the pattern at the extremity of the minor axis of the ellipse.

As to why, in Article 21, D was not represented in the pattern, we reply that at the time we did not think it necessary, rather

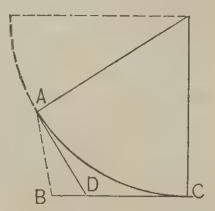



*D, Fig.* 2.

preferring to show that we were not bound to any one way of operating, and, as F lay nearest the center of the arc, it gave us a better point by which to draw the general curve of the pattern.

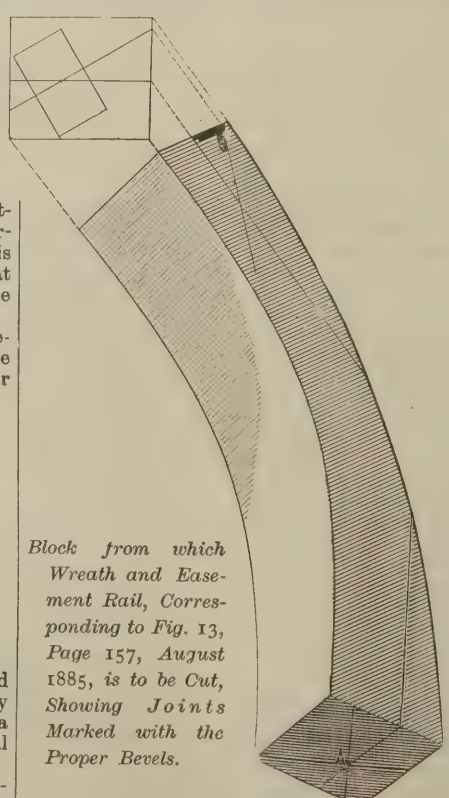
*B.* 1. "S. B." has done well in this drawing, but has made a slight mistake in the statement. In the sentence "Draw 4 5 at right angles to 4 *c*, and equal to 4 5 of plan," it should read "equal to F 5 of plan." F and 4 happen to come very near each other, but are not identical. 2. As to measuring the width of the pattern, if the design is to produce a proper sliding mold, the width of the rail may be transferred from the plan to the elevation on any level measuring line. Thus, if we draw on the plan not only the center line, but also the lines showing the width of the rail, then where the level measuring line crosses this plan we may take the distance across the rail and use the same distance on the corresponding measuring line in the elevation. But if we are going to use the string or trammel, we will not need such a measure. The width of our patterns was made, not by "guess," but in each case by a judgment based on experience and our knowledge of what must be necessary. There is never anything saved by being too fine about the exact width of a face-mold.

*C.* 1. The question about measuring the pattern on a level line drawn from corner of tangents across the elevated plane we have fully answered above. 2. Where we refer to "our method," we mean the plan of drawing generally employed in the series of articles. "S. B." should not leave out important parts of a sentence. In the August number referred to we say: "By the method 'here shown,' &c.," following which is the part our correspondent has quoted. We meant it exactly as the words read, viz., the method shown by the dotted lines drawn on Fig. 9. The next omission is also an important one, viz.: "From the outside corner." We repeat, when you desire to criticise, do not omit the important part of a sentence.




*D, Fig.* 3.

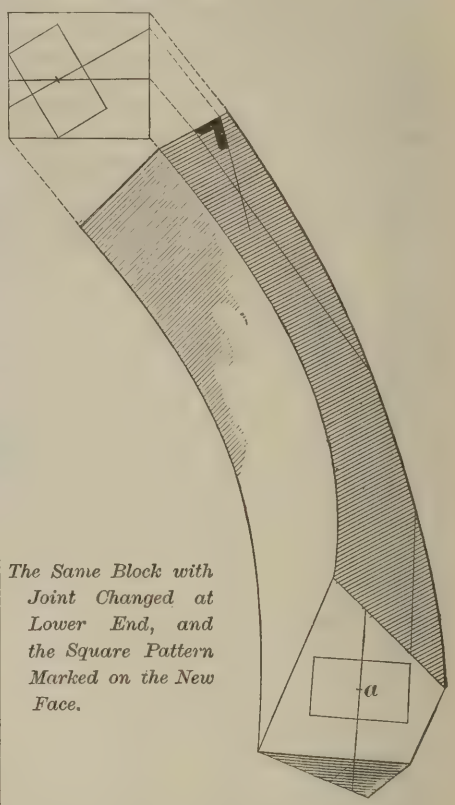
*D.* What our correspondent proposes to do can be done so far as the tangents and elevated plane are concerned; also the true center line can be drawn on such a plan so as to lie directly over the ground plan, but the butt joint at the bottom end of the wreath will not be what is wanted. It will be vertical, but otherwise at right angles with A B instead of A D. Nevertheless, it can be used as a basis of calculation in drawing the miter for the cap. The easiest way to accomplish the desired end is that



*Block from which Wreath and Easement Rail, Corresponding to Fig.* 13, *Page* 157, *August* 1885, *is to be Cut, Showing Joints Marked with the Proper Bevels.*

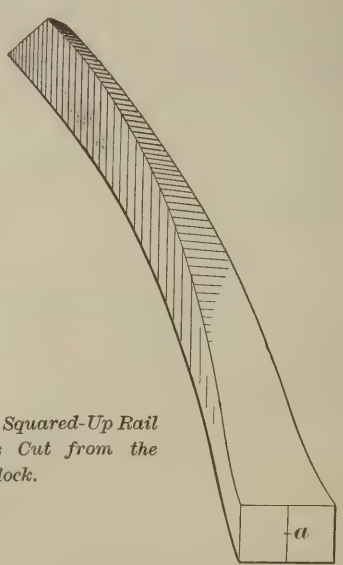
shown in the August number, Figs 13 and 14, and which we have more fully illustrated in this paper.

To make the meaning more clear of our description of wreath and easement rail, a plan of which was shown in Fig. 13 of the August number of our volume for 1885, we present herewith engravings made from




*The Same Block with Joint Changed at Lower End, and the Square Pattern Marked on the New Face.*

models of a piece worked to the lines there presented. The engravings represent the work to a scale of 1½ inches to the foot. The first shows a block with the joints marked with their proper bevels. The second shows the same block with the joint changed at the lower end and the square pattern marked on the newly-cut face, 3 inches higher up, as described. The third




*The Squared-Up Rail as Cut from the Block.*

figure shows the squared-up rail itself as cut from the block. These drawings being to scale as nearly as may be, our correspondent will be able to see by them that the plan of the tangent is here located 2 inches from the under side of the plank. The new point on the second face is marked *a*, corresponding with A at the end of the tangent. We trust that the foregoing explanation, together with the models and what we have hitherto published on this subject, will clear up all our correspondent's differences.

### Siding Nails.

*From* S. F. B., *Wellington, Ohio.*—I notice the inquiry from "H. L. W." about siding nails. Last spring we purchased a keg of 2-inch steel wire nails with round, flat heads.

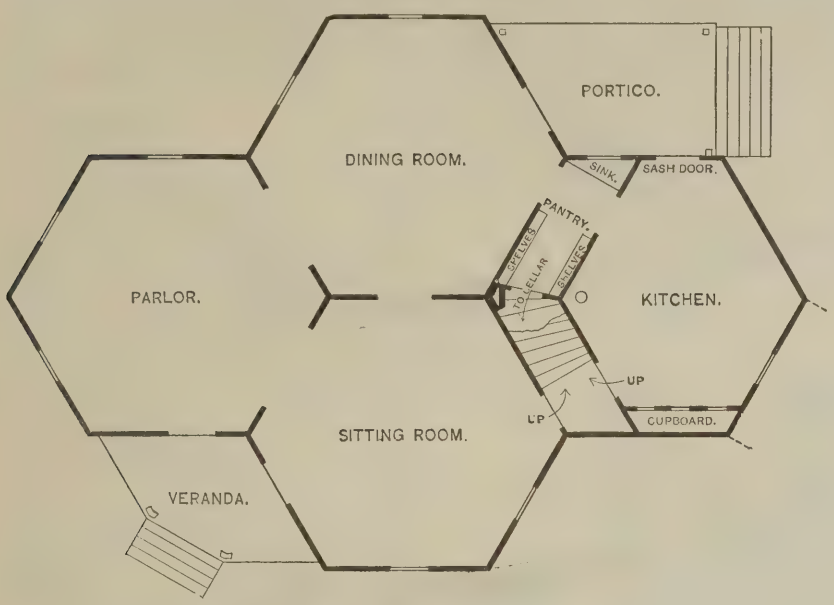
The nails were bought without my approval, and at first I was disposed to make fun of them. Upon trial, however, they proved to be the best siding nails we had ever used. They do not tear a big hole when driven, so as to let water follow through, and they possess the pleasing quality of driving close to the ends without splitting. They drive down smooth with the surface of the siding, and hold very securely. In fact, they are very hard to pull out. I think if your correspondent will try these nails he will like them. I have been in the habit of using 6d. common nails for the upper edge of drop siding and 8d. common for the lower edge.

*From* S. B. B., *Appleton, Wis.*—I notice that "H. L. W.," of Arlington, Neb., inquires for siding nails with large heads. I am curious to know why he wants siding nails with large heads. Good mechanics in this section of the country use 8d. casing nails, or, instead, 8d. finishing nails. I do not think your correspondent will be able to find a large-headed nail for siding. It is possible that he might use a common 6d. or 20d.

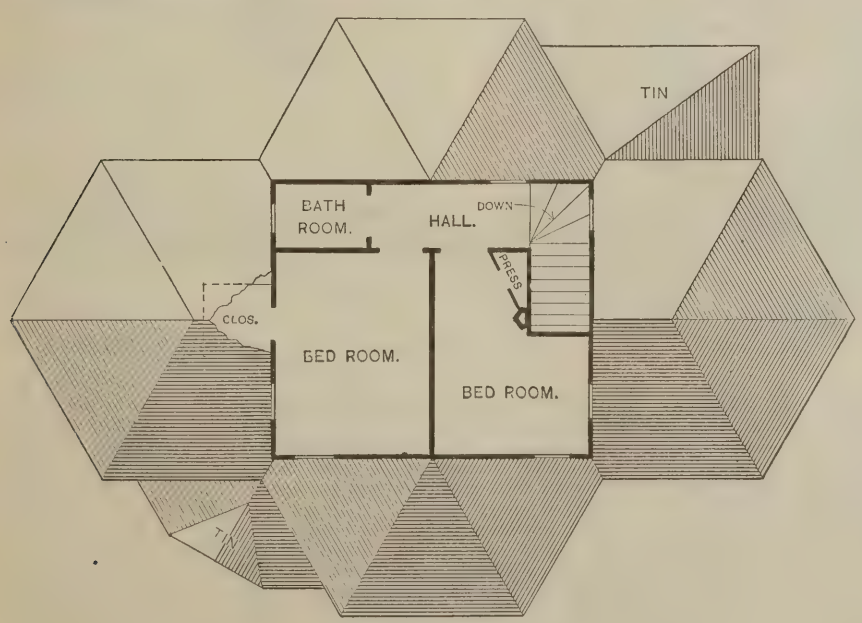
*Note.*—Largeness of head, accompanied by corresponding exaggeration of shank and length, perhaps does not meet our correspondent's requirements. We are disposed to think that the wire nail recommended by one of the correspondents above will come as near his requirements as anything that can be suggested.

### Hexagonal Floor Plans.

*From* S. W. H., *Enterprise, Kan.*—I have noticed in *Carpentry and Building* for the last year many plans of dwellings submitted by different subscribers, which have been carefully worked out with a view to utilizing all the space. Inclosed I send you the floor plans of a dwelling which I built something over a year since for myself, and which has given great satisfaction. My wife says that work can be done in it with less steps than in any house we have ever lived in. We would not exchange it for any other plan with which we are acquainted. At the outset we supposed carpets would be cut to a disadvantage, but we were happily disappointed in this respect as no waste whatever was necessary. The shape of the rooms gives plenty of wall space for furniture and at the same time provides good light and abundant ventilation. The parlor, sitting-room and dining-room are connected by folding-doors, to be used as occasion requires. In the winter the sitting-room is used as a bedroom. The stairs are box stairs with hanging-rail, and are accessible from either sitting-room or kitchen. Stairs lead to the cellar under the principal stairs, the passageway to them being utilized as a pantry. The chimney is so located as to accommodate three rooms on the first floor. The stove in the kitchen has an under draft to the chimney. The frame is thoroughly braced in itself. No braces outside of the regular framing were required. The roof over the second story is hipped and covered with tin. I would be glad to see in *Carpentry and Building* a plan containing the same number of rooms that can be built with so small a lumber bill and as little masonry as was required in this case, and at the same time will give as thorough ventilation with as good light to each room as was afforded by the plan submitted me. Each face of the hexagon is 9 feet 6 inches, outside measure.




*Hexagonal Floor Plan, Submitted by S. W. H.*

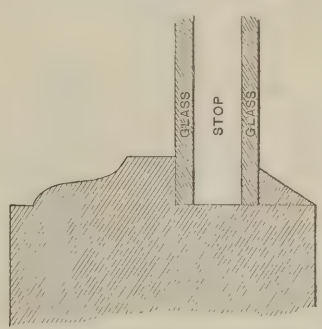



*Roof Plan of S. W. H.'s Hexagonal House.*

*Note.*—We have no doubt that our correspondent's plan submitted above will be examined with much interest by many of our readers. The shape of the cells in a honeycomb has often been commented on by naturalists with reference to the economy of room, and strength of the structure and in other respects. It would seem that, so far as the first story is concerned, our correspondent has imitated the industrious honey bee. He has departed from the traditions, however, in his second floor, and has laid off a parallelogram. We do not know that this is necessarily objectionable, but we call attention to it as indicating the peculiarities of the structure. It would have been interesting if our correspondent had sent us a photograph of the building, from which we might obtain an idea of its architectural appearance as well as its arrangement. If our readers have any comments to make on the plan herewith submitted we shall be glad to hear from them.

### Protecting Show Windows from Frost.

*From* C. G. P., *Clifton, Kan.*—One of the most effectual means, according to my experience, for protecting show windows from frost is to use two panes of glass placed about ¼ inch apart, as indicated in the accompanying sketch. Care should be taken to polish both panes before fastening in place. I have introduced this construction in several show windows and it has worked satisfactorily.




*Frost on Show Windows.*

*From* C. J. H. W., *Boston, Mass.*—The deposition of frost in the inside of store windows may be prevented by any means which will keep the temperature of the air in contact with the glass above its dew point, so that no water will be deposited on the glass. When there is an inner sash or partition separating the window space from the storeroom the window can be kept warm by keeping lights burning. Kerosene lamps may be kept burning near the window and be concealed from view by proper arrangements of the decorations and goods. Water is not liable to condense and freeze on the glass if the inner surface is smeared with a thin coat of glycerine or kerosene oil. A cloth wet with alcohol will remove deposits of frost and ice without the application of heat.

### The Red-Print Process.

*From* N. W. B., *Wheeling, W. Va.*—You have at different times explained to your readers the blue-print process. Will you also give a description of the red-print process, or the solution to use so as to produce a red-print, and greatly oblige ?

*Answer.*—We do not know of anything in the market that is called the red-print process. White lines upon a blue ground or blue lines upon a white ground are the processes most commonly employed and most generally known. A very large number of processes have been devised by ex-

perimental chemists, and reports read before scientific associations have described a great many of these. One at least, to which our attention has been called, suggests how red lines may be obtained, and this perhaps meets the requirements of our correspondent. The paper from which the following extract is taken was published some time since in the *Journal* of the Franklin Institute:

The salts of uranium are affected similarly to those of iron, but they offer no advantage over the iron salts, and are, besides, very expensive. Those who desire to try them may use the following formulæ: A good quality of paper must be taken and sensitized by floating for six or eight minutes on a solution of

| | |
|---|---|
| Uranic nitrate | 1 part. |
| Distilled water | 60 parts. |

When dry the paper is exposed under a drawing for 10 or 15 minutes, and is then removed and developed by floating on

| | |
|---|---|
| Ferrocyanide of potassium | 1 part. |
| Water | 250 parts. |
| Nitric acid | 2 drops. |

In about five minutes a brown picture will appear, which is fixed by washing in slightly acidulated water.

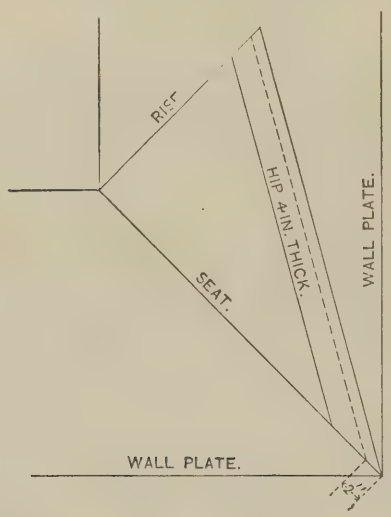
To produce a gray picture the print is boated on a bath of

| | |
|---|---|
| Silver nitrate | 1 part. |
| Water | 20 parts. |
| Acetic acid | A trace. |

The development is very rapid in this solution, being complete in 30 seconds, after which it must be taken out and thoroughly washed in clean water. Red, green or violet pictures may also be produced by developing on ferrocyanide of potassium, perchlorid eof iron or chloride of gold.

### Backing Hip Rafters.

*From* W. H. H. C., *Northfield, Vt.*—I have been very much interested in *Carpentry and Building* ever since its commencement. I hope its success will continue. There has been a great deal of effort and ingenuity exhibited by some of your correspondents in solving the hip-rafter problem, particularly with reference to methods of backing rip hafters. Why take the longest route when a shorter one is just as




*Backing Hip Rafters.—Design Accompanying Letter from W. H. H. C.*

good, if not better? I have for a term of years been employing a rule which is very simple and at the same time correct. When the horizontal or bottom cut for a hip rafter has been obtained, take one-half the thickness of the rafter and measure back from the toe or point toward the heel. This will give the point on the side of the rafter to gauge to. Then a line on the center of the top of the rafter in connection with a line gauged on the side will give the bevel or backing. The diagram that I inclose illustrates this better, perhaps, than I have explained it.

### Iron Roofs in Canada.

*From* J. H. Ferns, *Montreal, Canada.*—As buildings increased in hight in Canada, flat roofs, which were to a great extent substituted for the French or pitched roof, called for a different roofing material to that formerly used. Tin was tried, but did not give satisfaction. The excessive contraction in winter time broke the edges of the seams, and a flat-seam roof lasted but a short time. I do not pretend to say that the whole trouble was due to the variation of temperature; the quality of the tin itself, the manner of laying, or the light soldering, may have had their part in causing defective roofs; at any rate, the flat tin roof has not been a success. The standing-seam roof was then tried, but with somewhat similar results. The seams acted as an anchor to the ice, and cases were not rare where the tin was stripped off the roof in the attempt to dislodge the ice. Tar and gravel—or, as it used to be called, the "fire-proof roof"—did not fill the bill. In the summer time the tar ran into the gutters and conductors, and in the winter time the felt was torn asunder.

Galvanized iron was then tried, and is to-day one of the best roofing material in use, ranking next to copper. Although this is the case, from present appearances it is not likely to be long so. Not that galvanized iron is unadapted to the climate or unsuitable as a roofing material, but, owing to the inferior quality now used and the slighted workmanship, it is losing the place it once held as the roof covering. The first galvanized-iron roofs laid in this country were of such imperfect construction as to cause one to wonder how galvanized iron ever found favor as a roofing material. The fact of it working its way into general use is a strong evidence of its adaptability for a climate such as this. The following sketch, Fig. 1, shows the manner in which one of the earliest galvanized-iron roofs was laid. Wood strips, 2 x 1½ inches, were nailed on the roof, 26 inches apart. The sheets, having been edged on the ends for a lock seam, and the edges turned up square, 1½ inches high, were laid between the wood strips, the seams flattened down and a few nails put in on the edges. A square cap was then put over the top of the wood strip, covering the edges of the metal and fastened by nails through the top, the heads of which were soldered. This roof answered fairly well in summer, but as soon as the snow fell the water at once found its way through the unsoldered seams and over the edges of the sheets. A roof of this kind still covers part of a large warehouse in this city, and is constantly undergoing repairs. A modification of this roof was then tried (and, I think, patented), triangular strips being substituted for the square ones, Fig. 2. The iron was seamed in the same way as in the case of the square strips, but one edge was turned up larger than the other to allow of lapping on one side, which was then nailed to the wood strip, thus saving the necessity of a cap. As may be readily seen, this roof was no better than the other in winter time—in fact, the manner of lapping and

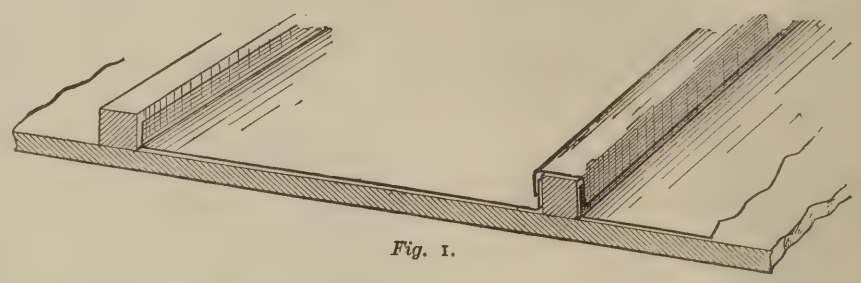


*Fig. 1.*

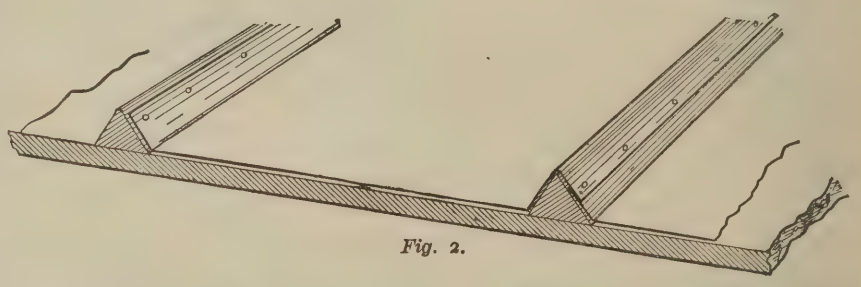


*Fig. 2.*

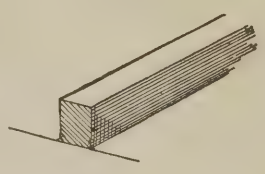


*Fig. 3.*

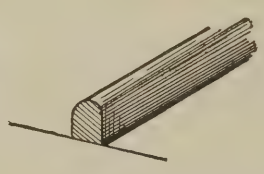


*Fig. 4.*

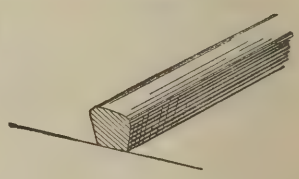


*Fig. 5.*

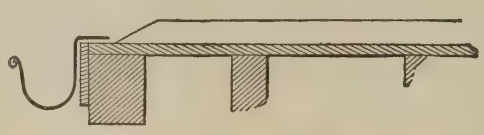


*Fig. 6.*

*Fig. 7.*

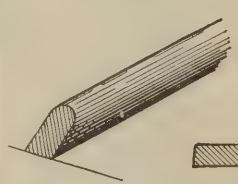


*Fig. 8.*

*Fig. 9.*

*Iron Roofs in Canada.—Sketches Accompanying Letter from Mr. J. H. Ferns.*

nailing had not the advantages of the cap. I may remark here that a common roof on the cheaper class of houses in this city of late is one of 28 gauge black iron, laid in the manner just mentioned. The proprietors, who, on the score of economy, have chosen that class of roofing, will ere long find it the most expensive and worthless roofing that they could possibly put on.

The next attempted improvement in galvanized iron roofing was that of riveting the sheets together, nailing the edges of the iron on top of the wooden strip and then soldering the edges and nails together. The first strip used was a square, Fig. 3, 1½ by 2 inches high. This was followed by one of the same size, with the top rounded off, Fig. 4. A smaller size of the same pattern is also used, but the one shown in Fig. 5 is the shape most suitable for this class of work. In preparing the material for a galvanized-iron roof the sheets are riveted together lengthwise the length of the roof to be covered, the rivets being not more than 1 inch apart and strongly soldered. A mistake too often made by all who use rivets is that of using rivets too large for the metal to be riveted. For two thicknesses of 28 gauge metal a 16-ounce rivet makes a better, stronger and neater job than a 2-pound rivet. In flattening down the larger rivet the shank forces open the hole in the metal until it is actually as large as the flattened portion of the rivet, and the joint depends almost entirely upon the solder to hold it together. As the sheets are riveted they are rolled up until the necessary length is joined together, when a tack of solder on the end prevents it from rolling out, and leaves it in a convenient form for handling. The rolls are now taken to the roof and opened out as wanted. Premising that there is an eave-trough to the building, this is put on first and lapped on the roof about 2 inches (Fig. 6). A roll of iron is then taken to the head of the roof, the solder tack broken, and, holding on to one end, the roll let go, when it rolls to its place. If the roof is bounded by a fire-wall, about 6 inches is turned up square on one side and placed against the wall, and the other side turned up by a pair of tongs gauged to 2 inches or more, according to the size of the wood strip. The end of a wood (Fig. 8) strip is now cut off on the angle and placed against the edge of the iron, about 3 inches from the edge of the roof, and nailed firmly to the roof. The edge of the iron strip is then beat down on top of the wood and nailed every 6 or 8 inches, just enough to hold it until the next strip is laid. A mallet such as shown in Fig. 7 is a most useful tool in work of this kind, as it is a mallet and hammer in one. The next strip is edged up with the tongs in the same way and placed alongside the first strip, and the iron beat down upon the other, giving a lap of about ½ inch. This is nailed through the two thicknesses of the iron, and the nails ought not under any circumstances to be more than 1 inch apart. This is continued until the whole roof is covered, the wood strips being nailed to the roof as soon as the metal strip is put in its place, and not before. The joints on the top of the wood strips are then soldered, when the roof is complete.

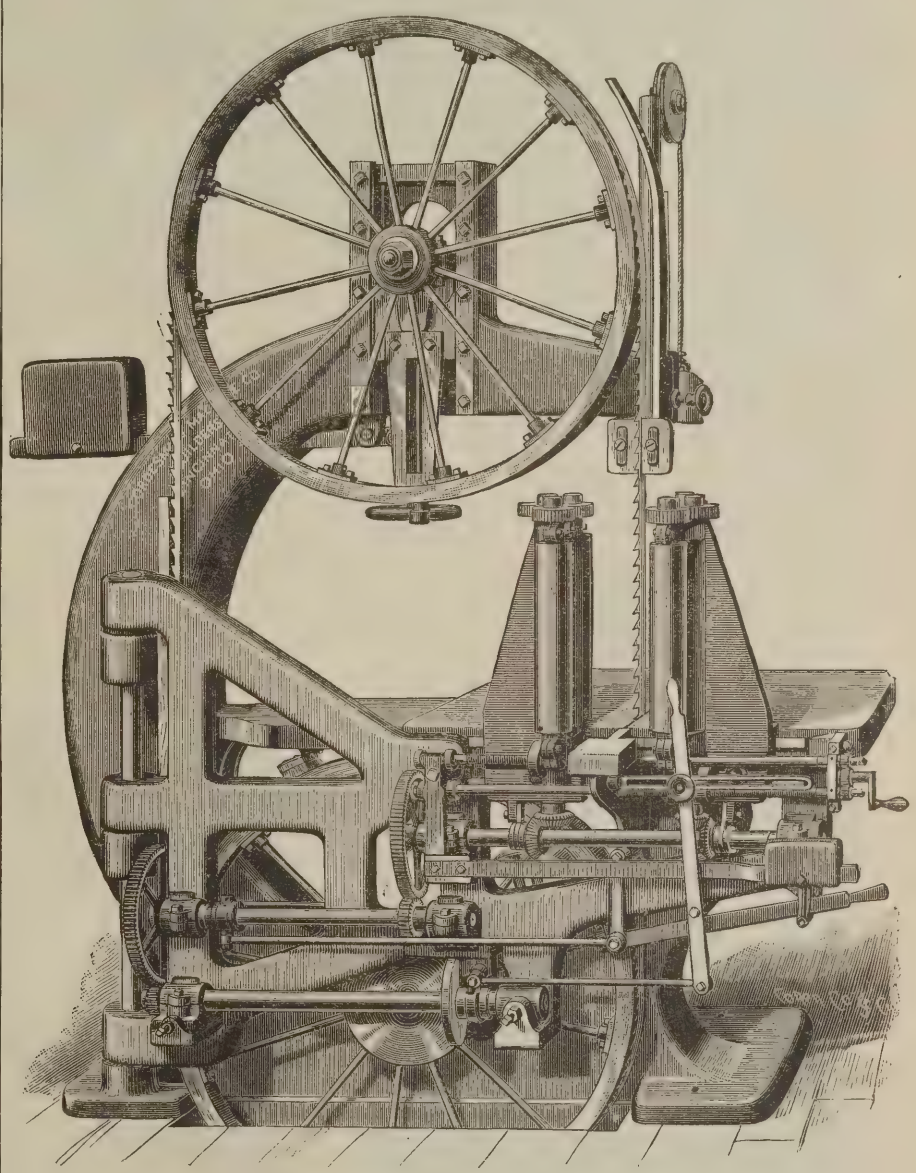
In an ordinary square roof there should be no nails connecting the metal to the roof other than those which fasten it on top of the wood strips and connect it with the gutter. The lap of the gutter on the roof being about 2 inches, the strips should cover 1 inch of this, be closely nailed and the solder floated. As there are no nails and no seams, and as each strip is independent of the other, this roof is, theoretically and practically, one of the best to meet the climatic changes of this or any country. When the metal expands it binds between the two strips and buckles in the center (Fig. 9), and when cold it falls back into its place.

A roof of 26 gauge iron, 24 inches wide, well riveted, nailed and soldered, with an air space under the roof well ventilated, will make as durable and satisfactory a roof covering as could be desired. When, as is the case on one of the large banking institutions in Montreal, the roof is of copper laid on this principle, we then have a roof which, at least on a flat roof, fills the bill for durability, security and adaptability to resist climatic changes.

# NOVELTIES.

### Scroll Band-Saw.

Fig. 1 of the engravings represents a new band sawing machine intended particularly for heavy work, which has recently been brought out by the Cordesman Machine Co., of Cincinnati. The machine is adapted for scrollwork and resawing, and is of special interest to all establishments doing heavy work, such a shipbuilding, car constructing, carriage and wagon making, and the manufacture of agricultural implements. It is likewise useful in furniture factories, planing mills, organ establishments, &c. The machine is adapted to using saws from the lightest, say ¼-inch wide, up to heavy saws, say 2½ to 3 inches wide, and one special advantage to which the makers direct attention is that it is suited equally well to light and heavy work. With reference to capacity the vertical hight under the guide is 24 inches, and the distance between the column and the saw is 48 inches. The frame is cast in a single piece, and has a rectangular cored section. The makers state that it is capable of withstanding a strain equivaient to 1½ tons on the wheel axis without affecting the saw guides. A large base is provided which secures a substantial floor support. The wheels are 48 inches in diameter and have a face 3½ inches in width. The rims are made of the best wagon-makers' ash, and are steam bent. The spokes are made of hydraulic tubing, one end of each of which is screwed into the cast hub and the other into a wheel pad. The latter are securely fitted fitted and bolted to the rim. The face of the wheel is covered with leather or rubber firmly cemented in place. The upper wheel has a vertical adjustment, as shown in the engraving, and also can be angled to lead the saw in any path while the machine is in motion. The table is of iron, and is large and heavy in proportion to the machine. It pivots in a circular bearing, and can be adjusted to any angle in a moment's time and held rigidly in position by a new device recently patented. The feed-works are mounted on a swinging frame which is swung to the main column. This attachment consists of four 4-inch power driving feed-rolls, strongly geared and provided with a graduated feed, all controlled on one side of the machine by means of hand-levers, by which the feed is variable instantly from slow to fast; thus, by their use the operator can run hard or knotty parts slowly through the machine and then instantly increase the rate of feed when softer wood is reached. The rolls are self-centering, and will center a board or timber of any thickness up to 10 inches and of any width up to 24 inches. One side of the double feed-rolls can be made stationary while the other side yields, thus enabling the operator to cut a slab, say, ¼ or ½ inch thick, off a board of any thickness up to 5 inches. The works are also provided with a clutch controlled by a lever, by which the feed-works can be stopped and started at any time without stopping the machine. If the feed-works are not wanted the change adapting the machine to scrollwork can be made in 20 seconds, for all that is necessary

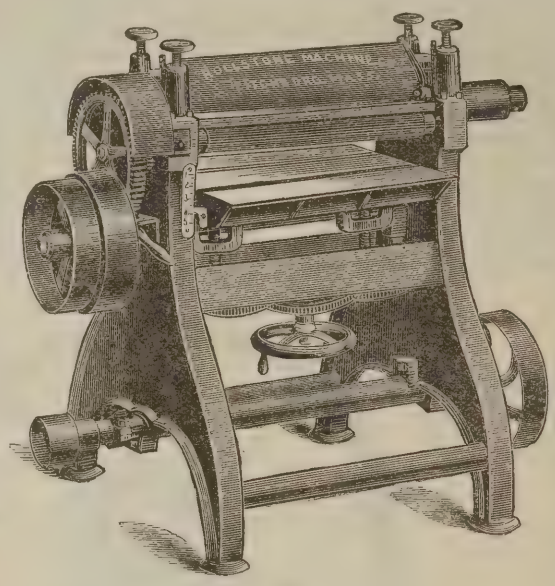


*Novelties.—Fig. 1.—New Scroll Band-Saw.—Cordesman Machine Co.*

to do is to swing the frame with the feed-works around on one side of the machine. By this means this adjustment is placed entirely out of the operator's way, and at the same time where there is no chance of an accumulation of sawdust on the works. When the feed-works are out of the way the iron table which slides on long ways or runs fastened to the main frame is slid forward. This done the machine is in position for straight or curved sawing, as may be required. Where the machine is desired for special purposes modifications in its construction are made.

### Panel Planer.

Fig. 2 represents a panel planer recently brought out by the Rollstone Machine Co., of Fitchburg, Mass. From a description furnished by the makers we glean the following particulars and special advantages claimed for the machine: The frame is stiff, the sides being heavily ribbed and strongly braced, and the parts throughout so combined as to insure rigidity. The bed runs on planed slides which are arranged with jibs to take up the wear. The bed is raised and lowered by two screws which are operated by three gears and the hand-wheel shown underneath the bed. The two feed-rolls are 1⅞ inches in diameter. The entering roll is fluted and the drawing-out roll plain. They are geared together and are held down by four rubber springs which are adjusted by four pressure screws. Pressure-bars are provided both back and front of cylinder to assist in holding the stock. The cylinder is made from a solid-steel forging, and is planed, with lips which come close to the cutting edges of the knives. The knives swing in a 3¼-inch circle. The bearings are long and run in boxes lined with Babbitt metal. The cylinder pulley is 5 inches in diameter and 4 inches wide. It is calculated to make 4000 revolutions per minute. At the bottom of the machine is a feed-shaft which is run from a pulley on the extreme end of the cylinder-shaft. This transmits by two coned pulleys two changes of speed to the feed-rolls. The feed is stopped and started by lever and clutch gear. These planers are built to plane 12 and 20 inches in width, as required. They have a capacity from $\frac{1}{16}$ inch or less in thickness to 5½ inches thick.




*Novelties.—Fig. 2.—New Panel Planer.*

### Bogy Self-Closing Butt.

The Duggan-Parker Hardware Mfg. Co., 812 South Twelfth street, St. Louis, Mo., are offering to the trade a self-closing butt, the general appearance of which is shown in the accompanying illustrations. Fig. 4 shows the form of the several parts of the butt separately, and Fig. 3 shows them together in the position they occupy when the door is open. The peculiar construction of this butt, it will be noticed, is such that in opening the door half of it is raised, the interlocking parts through which the pin passes being inclined planes. The operation of opening the door raises the door about ⅜ inch to the position indicated in Fig. 3, and its tendency is to close by the force of gravity, the door, in fact, sliding down the inclined planes of the butt. The manufacturers, alluding to this special feature, refer to the butt as compact and of usual size, and at the same time possessing the advantages of an ordinary spring hinge. These butts can be placed on the outside or inside of the door casing, and either at the right or left of the door. The manufacturers also call attention to the simplicity, durability and points of advantage possessed by their butt, which they expect will meet a want of the trade.

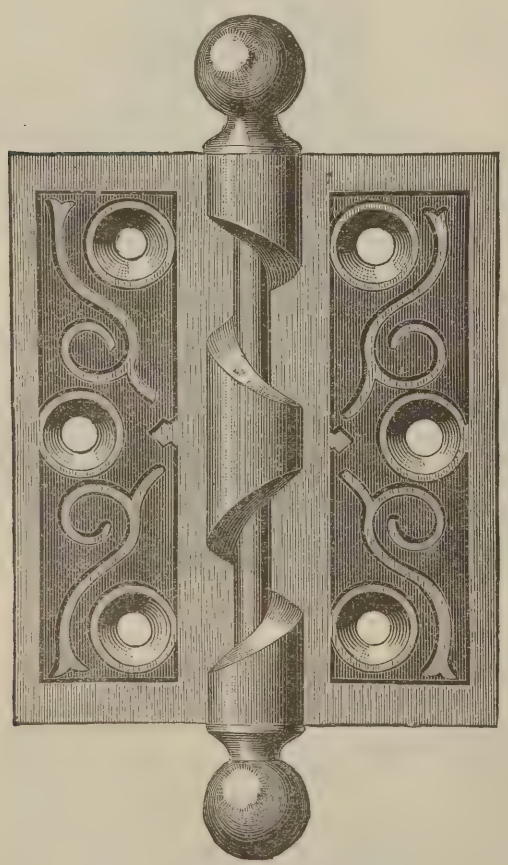


*Fig. 3.—Bogy Self-Closing Butt.—General View.*

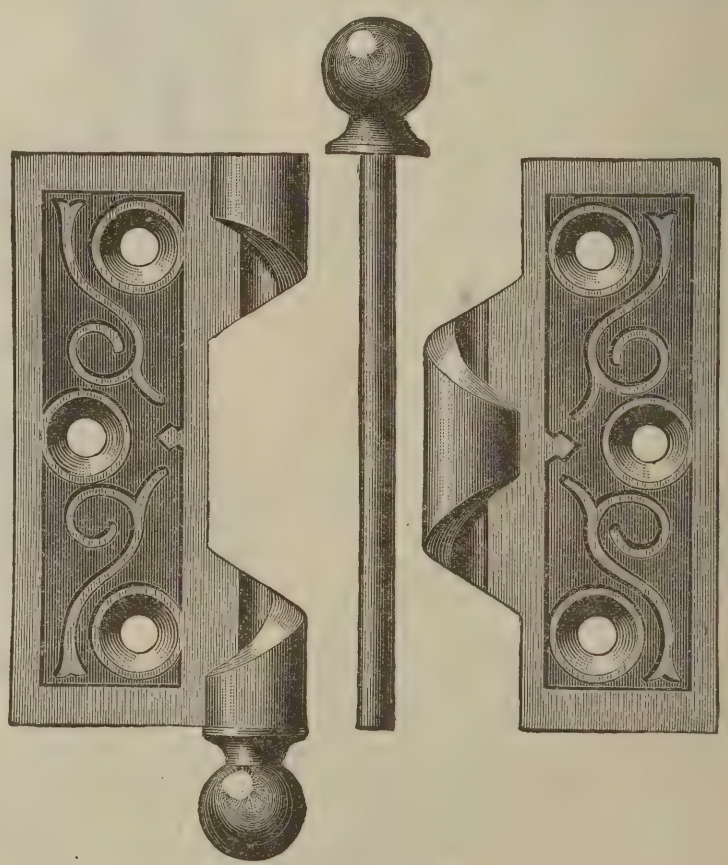
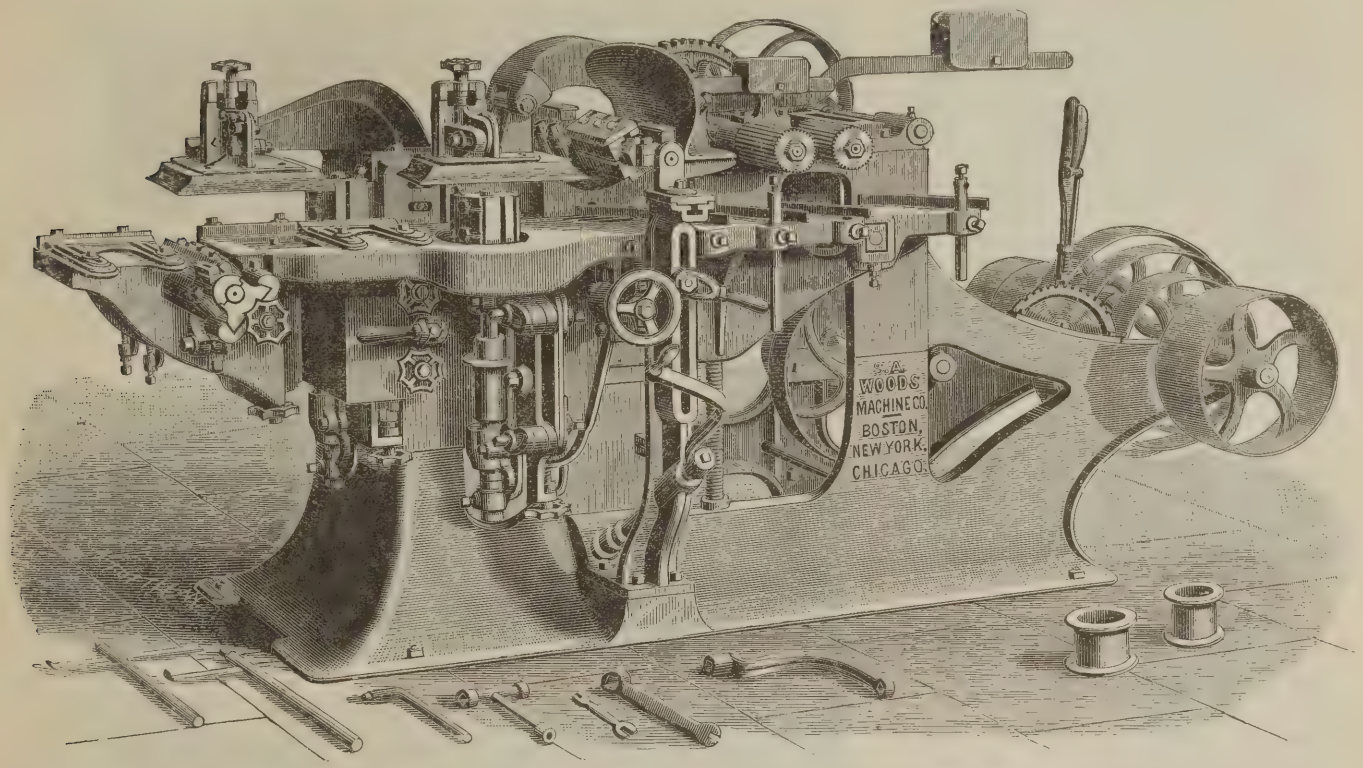


*Fig. 4.—Showing Separate Parts.*

### New Outside Molding Machine.

The S. A. Wood's Machine Co., with offices in New York, Boston and Chicago, have recently perfected the new pattern outside molding machine illustrated in Fig. 5. It is of interest to woodworkers in general, including sash and blind makers, furniture manufacturers and others, and is claimed to have many points of superiority over other machines for similar work. The makers direct attention to the construction of the frame, which is such as to give great strength and solidity to the working parts. The frame has a broad base, curving out to give direct support to the outside bearing of the top cutter-head. The table which carries the under head and both side heads is raised and lowered by the crank shown in the cut, which is so placed as to be easily reached by the operator and which acts with two screws so geared as to move easily. A half-turn of the handle back of the outside head holds the table firmly in place, while a similar turn of the handle at the support of the outside bearing clamps the base, the movable table and the top head all solidly together. This arrangement of parts, it is claimed, constitutes the best outside bearing yet devised. By loosening two bolts the upper portion of the standard may be entirely removed when it is desired to work on one edge that is very wide or to change the top head. The box is removed by loosening one bolt that works in the slot shown. A desirable feature in this machine is the carrying of both side heads up and down with the bed. They are also so arranged as to be adjusted from the

front or working side of the machine, set at an angle, moved out or in, raised or lowered, all from the working side. The heads are slitted on four sides and the side heads are secured to the spindles by set-screws placed obliquely in the upper end of the head, as shown in the cut, leaving all four sides of the head free for cutters. All four heads have an endwise adjustment, each being controlled by a hand-wheel. The feed consists of two top and one bottom rolls, all driven, the two top rolls hanging in a rocker frame in such a manner as to rest firmly on the stock independent of each other, however uneven the lumber, while the end roll is driven at all thicknesses. The fluted rolls can be readily removed for spur-feed when desired, and if the spurs used are of different diameter than the rolls the driving-wheel for the end roll may be adjusted by the clamp bolt, thus making an idle or friction roll of the bottom one. The tension of the feed-belt is controlled by the upright lever, and three speeds of feed can be obtained. The top pressure-bar is heavily weighted, and may be set as near the cutting edge as desired, having sufficient adjustment for all lengths of cutters. The opening for the under cutters may be as wide or narrow as desired by moving the mouthpiece on either side of the opening. The construction of the boxes and bearings throughout the entire machine is such that the belts pull against the bed of the box instead of the caps, also against the main portion of the frame, whenever there are adjustments or connections. The value of this feature over the usual way will be appreciated, since it relieves all cap screws and connecting bolts from strain. The side springs are so placed as to hold the stock firmly in position. The end table may be tipped down by loosening the bolts over the loop slot shown, giving free access to the under cutters. This may be done without moving any of the guides and even while stock is being worked. This enables the operator to see exactly how to set and adjust the under cutters.




*Novelties.—Fig. 5.—New Outside Molding Machine.—S. A. Woods Machine Co.*

### Lathe for Turning Square and Polygonal Work.

In Fig. 6 is shown a new machine for producing what is very commonly known as "square turned work," which is manufactured by S. E. Smith & Bro., No. 227 West Fifth street, St. Paul, Minn. The machine, the makers claim, operates upon a different principle from that upon which other devices are constructed, and, further, that it has the prestige of two years' practical use in their own shop before it was offered to the trade. They claim, in addition, that by means of it from four to six times as much work can be accomplished as can be done in a common lathe. The expense of square and polygonal forms of varied and pleasing design in the past has prevented their extensive use. By the use of improved mechanical devices for their production the employment of such forms in the future is likely to be greatly increased. Referring to the engraving, it will be seen that in its general style the machine resembles a cylinder. This is so arranged as to receive upon its periphery the different pieces which are to be treated. The wheels or rings constituting the cylinder are adjustable, so as to adapt the device to use with materials of different lengths. The pieces to be cut are held on the machine by a series of clamps or shoes, which operate by a lever which is quick and powerful in operation. When the lever is thrown back a spring instantly raises a clamp from off the work and throws it back out of the way, as shown at the right of the machine in the engraving, thus leaving that part entirely free of all incumbrances and enabling the operator to place the materials thereon or to turn over with great rapidity those that are already in position. When the materials are in place they may be instantly clamped to the machine by a single movement of the lever. The construction is such that a very short space of time is required to fill the machine with materials or to turn them over as is necessary in the process of working. After the several sections of the machine have been filled the pattern that is to be produced is determined and a spur gauge is made to mark the work by, as in ordinary turning. The machine is then started, taking off a light shaving to reduce any unevenness. The work is then

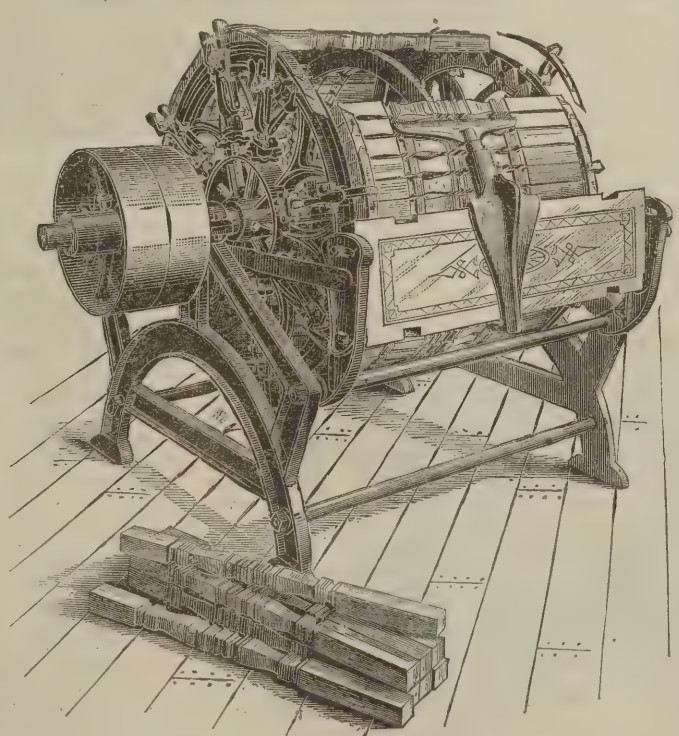
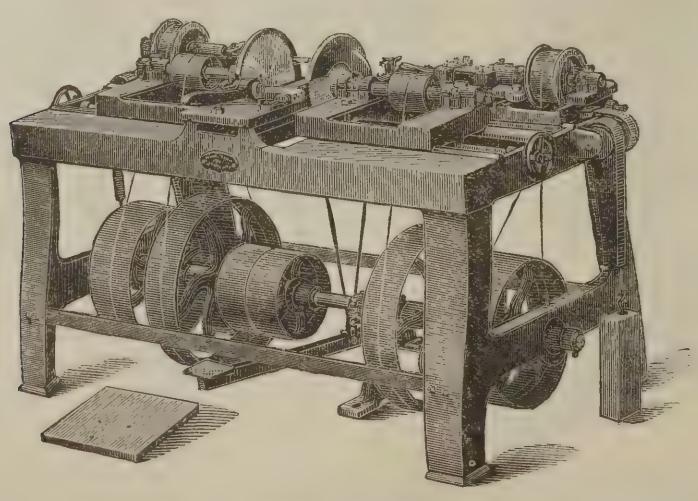


*Fig. 6.—Smith's Lathe for Square and Polygonal Work.*

marked with a gauge and one side cut. This done, the pieces are turned so as to bring the other sides successively against the tool. A little skill, it is claimed, enables the operator to cut all the sides alike, and that without trouble. When it is desired to make octagonal work the parts are first turned square and are then placed in the angular seats shown in the engraving, in which position the corners are turned off. The general scheme upon which the machine is constructed is readily understood by a glance at the engraving. A tool-rest is shown at the front. The periphery of the drum is so large as to make the several faces of the finished work practically straight lines. A circular which the makers have published contains a long list of the advantages pertaining to this device. Among them we note the assertion that inexpensive knives or tools are required, the cutting being done by the use of ordinary turning tools, as on a common lathe. Another is that the style of work done is not limited to stated patterns, but that the styles may be varied indefinitely, the same as in ordinary turning. The work may be sandpapered while on the machine and perfectly finished, thus securing smooth surfaces and sharp edges. No extra parts are required in changing from one size of materials to another. It is claimed that the machine is heavy, well balanced, and runs perfectly true and steady, thus enabling the turner to produce the finest work.

### Chair-Makers' Machine.

Fig. 7 represents a new machine recently put upon the market by the Rollstone Machine Co., of Fitchburg, Mass. It is of interest to chair-makers and other woodworkers. It is described as a cane seat side-rail jointer and doweler. It is all iron and steel in its construction and occupies a floor space of 3 x 5½ feet. It is provided with iron carriages carrying 10 inch saws for cutting the stock to length. These carriages are adjustable by means of handwheels and screws, each being independent of the other. The carriages slide on V-tracks and are so arranged as to cut stock from 9½ to 14 inches in length. The machine is also provided with iron carriages for carrying dowel bits, each being independent and being brought up to the work by means of a foot treadle and carried back by a weight. Each stand has two dowel bits and will work stock the same as the saws, namely, from 9½ to 14 inches long. Carriages are provided with oilcups for oiling the track. The machine is also provided with a track and two carriages for carrying the stock to the work. One of these is 9½ inches and the other 14 inches. The table on which the work is placed is provided with a cam-clamp for holding the stock in place. The counter-shaft attached to the machine has tight and loose pulleys, 10 x 4½ inches in size, drivers for the dowelers 16 x 6 inches, and drivers for the saws 20 x 4 inches. The machine appears to be well adapted for the purpose intended, and will no doubt be received with favor by the trade.



*Novelties.—Fig. 7.—Cane-Seat Side-Rail Jointer and Doweler.*

### Carved Moldings.

The moldings shown in Fig. 8 are full-size representations of carvings produced by machinery operated by the Cincinnati Molding Co., Cincinnati, Ohio. The work shown may be described as real carvings, in contradistinction to the pressed or embossed work which is largely manufactured and used at the present time. The designs are selections from a very attractive assortment numbering nearly 100 which the catalogue recently issued by the company contains. The work has a wide range of applications, and may be used in cornices, borders, dadoes, raised panels, trimmings about mantels, &c. The styles here shown are particularly adapted for cornices, borders and dadoes, and not a little interest centers in the low prices at which they are supplied. Machine-carved moldings, we believe, were first manufactured some 30 years since, and at the outset were used exclusively in this country for furniture and cabinet ornamentation, being employed about pianos, office fittings, &c. In Europe, in addition to this, they were used for inside finish and decorations of rooms. Some 20 years ago or more, what is termed the "freezing" machine or shaper made its appearance and soon came into general use. It produced plain moldings only, but its effect was to drive curved and serpentine moldings out of the market Some 10 years since the fashion for carved moldings revived, and cabinet-makers and furniture manufacturers commenced producing the work by hand. Since then the demand has increased from year to year and has had the effect of stimulating inventive talent in devising machines adapted to produce such work, and has revived interest in the means used many years since in making carved forms. The moldings which the Cincinnati Molding Co. are manufacturing imitate hand-carved work much more closely than anything we have ever examined, and accordingly very satisfactorily supply a need experienced at the present time by all who have anything to do with fine cabinet-work, inside finish or furniture construction. The work is produced on machinery which, while embodying some of the same princi-

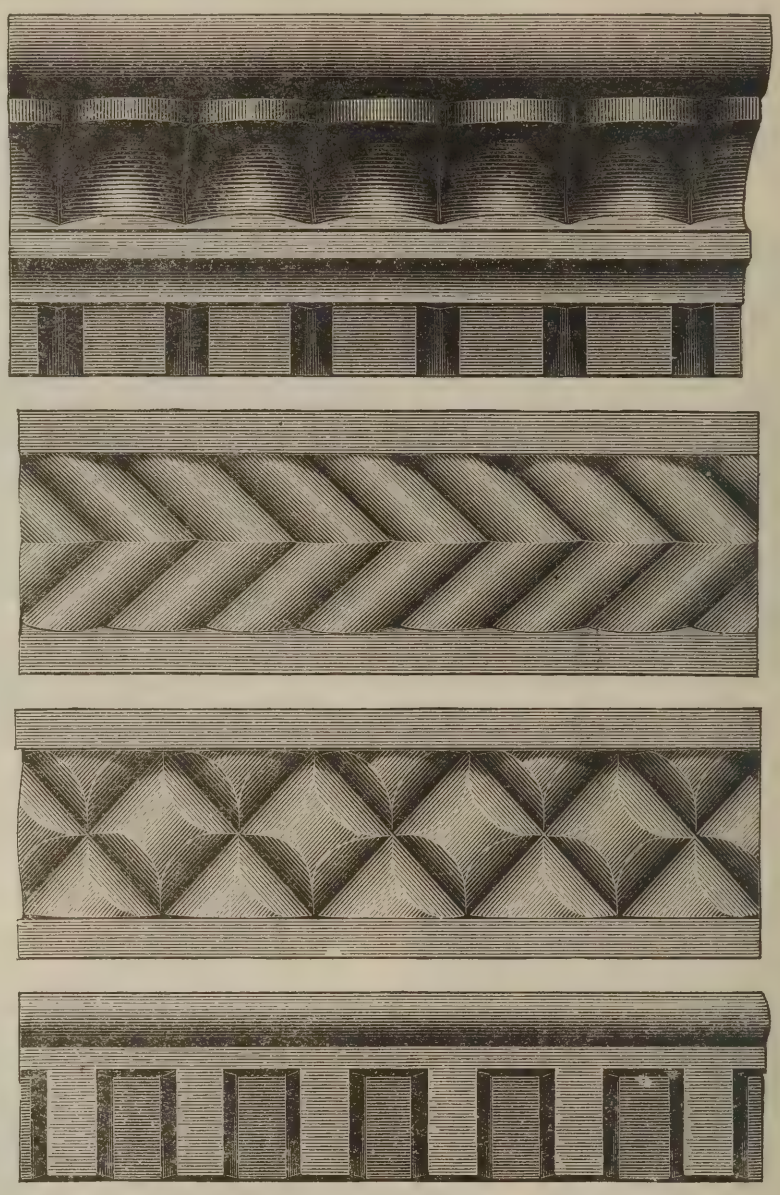


*Fig. 8.—Specimens of Machine-Carved Moldings.—The Cincinnati Molding Co., Cincinnati, O.*

ples as were successfully employed many years since in carving devices, is essentially new and fully adapted to the demands made upon it. From a careful examination of the designs presented in the catalogue it would seem that almost any design that can be conceived can be made, for the assortment is large and varied. In addition to this, new designs are promised from time to time in the future. We understand that the patterns can be worked in any of the hardwoods commonly employed in cabinet-work, the only requirement being that the wood shall be of a tough nature or with the fibers interlocked, so as to avoid easy fracture. The designs in the catalogue referred to are priced in walnut, cherry and mahogany.

## Non-Acceptance of the Lowest Tender.

Builders in this country very generally complain of the injustice that is frequently done them by the way in which lettings are conducted. The builders and contractors of Great Britain, it would seem, are also the victims of bad faith in similar directions. The following is what the "Builders' Blue Book" has to say on the topic of "Non-Acceptance of the Lowest Tender":

"All over the country complaints are made by builders of the abuse of a clause in invitations to tender, the use of which, within proper limits, is not only justifiable, but absolutely necessary. That some such saving clause is necessary we are free to admit. It would be altogether absurd to think for one moment that, having advertised for tenders, one should be bound to accept either or the lowest, or even to recompense in any way the tenderers. Again, it sometimes happens that, although a man may be willing and wishful to build, yet he finds the cost of his proposed works is much greater than he had anticipated or had been led to believe, and therefore the insertion of the clause in his invitation is a wise provision against responsibilities. Or it does sometimes happen that the proprietor, from unforeseen circumstances, is prevented from carrying out his intentions, and that unwillingly; and then, again, the clause has its proper use. But, looking at the misuse of it, we say unhesitatingly it is plainly dishonest that services rendered by 15 or 20 builders should be rendered for the purpose of learning the exact sum at which the contemplated works may be placed in the hands of this proprietor's friend or that architect's favorite. If such a system as has been recently adopted continued to obtain there would be an end to all *bona fide* tendering, as no man who cared one jot for his reputation or had regard for his time would spend money, time and brains without the knowledge that his tender would be received and treated with perfectly good faith. It seems enough to us that he should be willing to send a tender on the faith that it will be fairly treated, and not that after the cost of its production it should be used to his disadvantage. We have been thinking chiefly of those tenders which are necessarily advertised, but much more intensely do our remarks apply to those gentlemen who, asking a certain number of tradesmen to tender, even then refuse to accept the lowest. These cases are numerous, and we cannot but repeat that this means is used to keep the friend or favorite honest. The remedy, if the disease increases, must rest in the builders' own hands. It seems to us very simple. Ask the question, Should any tender be accepted, and mine is the lowest, will it be accepted? This may apply both to invitations public or private, and if a satisfactory answer is not given the builder must be content to forego his chance, or he tenders with the knowledge that probably he will be defrauded of his money and knowledge. We call to mind one architect's invitation, which is always couched thus: 'Mr. A. B. does not bind himself to accept any tender, but if either is accepted it will be the lowest.' In this gentleman's hands a builder may feel himself perfectly safe, and we commend his example to those of his brethren who use other forms We have, we think, pointed to what is felt by builders to be a great and growing evil, but we hope it will be only necessary to call attention to the matter, and trust firmly that the well-known honesty of English gentlemen will, without resort to any extreme means, be sufficient to remedy the wrong."

## NEW PUBLICATIONS.

THE CONSTRUCTION OF TRUSSED ROOFS. By N. Clifford Ricker. Size 6 x 9 inches, 158 pages, 115 engravings; bound in cloth. Published by Wm. T. Comstock. Price, $2.

This work may be described as a course of study in graphic statics, with special application to trussed roofs. It represents the course pursued by students in the School of Architecture of the University of Illinois, in which the author is professor. A portion of the work originally appeared in the form of a series of articles on the construction of roofs published in *Building*. To this series enough new matter has been added to make the present work a very acceptable manual for instruction, for private study and for reference. Among the new features which the book contains is formula for determining the lengths of members of roof trusses. The work is comprised in nine chapters, the titles of which are as follows: "Elementary Graphics," "General Construction of Roofs," "Loads and Pressure on Roofs," "Ritter's Method of Moments," "The Graphical Method," "Lengths of Truss Members," "Formulæ and Tables," "Sectional Dimensions of Truss Members" and "Details of Truss Joints." The work is supplemented by a very comprehensive index.

ARCHITECTURAL STUDIES. Part III: Thirteen Designs for Stables; edited by F. A. Wright. Size 11 x 14 inches; paper cover, loose plates. Published by William T. Comstock. Price $1.

The above is the third installment of the work entitled "Architectural Studies," and contains plates Nos. XXV to XXXVI inclusive. The subjects, as indicated in the title, relate to stables entirely. They represent work of different architects, among whom may be mentioned Brunner & Tryon, Rossiter & Wright, W. A. Bates, J. D. Hunter, W. C. Haslet, J. H. Duncan, all of New York City; also John Calvin Stevens, of Portland, Me.; Charles A. Clifford, of Newark, N. J., and E. M. Wheelwright, of Boston, Mass. The only text is in the form of a general preface entitled "Notes on Stables," and is confined to the most general consideration of the subject. The designs presented cover a very wide range of requirements, and for the most part as much attention has been given to picturesque appearance as to interior arrangements. The designs are presented in the majority of cases in perspective, with floor plans drawn to scale.

## The Crushing Strength of Brickwork.

From the "Excerpt Minutes of the Proceedings of the British Institution of Civil Engineers" we extract the following record of some experiments made by Mr. G. Sacheri on the crushing strength of brick work. These experiments were made with blocks of brickwork of three sizes—(A) 0.35 m. (1 foot 2 inches), (B) 0.46 m. (1 foot 6 inches), and (C) 0.64 m. (2 feet 1 inch) square, respectively. In each case the hight of the block was six courses. A slab of stone was placed above and below each block in order to distribute the pressure. The testing machine was capable of working up to 750 atmospheres. The diameter of the cylinder was 14.8 inches. The bricks were those commonly used as the best in Turin, not specially made. When tested singly the breaking weight of four samples varied from 360 to 500 pounds per square inch for the first crack, and from 1777 to 2225 pounds for complete fracture, the means being 432 and 2053 pounds per square inch, whereas the crushing strain of special bricks reaches 2844, and in very exceptional cases 4863. pounds. The mortar was made of lime from Casale. Eleven months were allowed for the brickwork to set. Half-bricks were used in blocks B and C. The mortar was from 0.27 inch to 0.4 inch thick, and proved to be stronger than the bricks. Two ½-inch boards were placed above and below the brick blocks when placed in the press. The first block experimented on was one of the largest size, C. The bricks of which it was built were burnt in a continuous kiln. The first—scarcely perceptible—crack occurred at one corner under a pressure of 1151 pounds per square inch. At 1250 pounds vertical cracks began to appear at a distance of 7 inches from the same corner. At 1459 pounds the cracks became numerous and extended half through the blocks. At this time the stone slabs began to split. At 1635 pounds the block may be said to have been completely crushed, and on the pressure being removed it was found that the inside was reduced to a mass of powder.

The second block was of the same size, the only difference being that the bricks had been burnt with wood in an old-fashioned non-continuous kiln. A layer of cement was spread between the wooden slabs and the faces of the press, and when the experiment was finished it was found that the cement had not been spread evenly. This accounted for the block giving way sooner than was expected. The first crack appeared at a pressure of 540 pounds per square inch. At 1113 pounds there were cracks all over the block. The experiment was not continued further, as it was not intended to completely crush this block. The other experiments are described in detail, and the results are summarized in the following table:

| | Pressure in lbs. per sq. in., at which took place: | | | |
|---|---|---|---|---|
| | The first crack in the brick-work. | The first crack in the stones. | Cracks and fissures on all the faces. | Compl'e crushing. |
| Single bricks (mean)..... | 432 | ..... | ..... | 2,053 |
| 1. A block (1 ft. 2 in. sq.). | 806 | 921 | 921 | ..... |
| 2. A block (1 ft. 2 in. sq.). | 576 | No cr'ks | 921 | ..... |
| Mean ... ..... | 691 | | 921 | |
| 1. B block (1 ft. 6 in. sq.). | 711 | 924 | 1,257 | ..... |
| 2. B block (1 ft. 6 in. sq.). | 711 | 711 | 1,038 | ..... |
| Mean..... | 711 | | 1,147 | |
| 1. C block (2 ft. 1 in. sq.). | 1,151 | 1,459 | 1,459 | 1,635 |
| 2. C block (2 ft. 1 in. sq.). | 537 | 537 | 1,113 | ..... |
| Mean..... ..... | 844 | | 1,286 | |

Commenting on the experiments Mr. Sacheri remarks:

1. That complete rupture requires a far higher pressure than the first crack.

2. That the first crack is frequently due to a local cause, and that the third column is a better test than the first of the strength of the blocks

3. That in every case the first crack occurred within about 4 inches of a corner; that the bricks always gave way before the mortar; the direction of the cracks was generally vertical.

4. That bond stones are not much use.

5. It appears from the third column that the resistance per unit of sectional area is higher in the larger blocks than in the smaller.

6. Though the increase of pressr ure was applied slowly, and a period of rest was allowed after each increment of 10 tons, still the conditions were very different from those of dead weight.

7. The conditions differ from those of practice in that the mortar was allowed 11 months for setting before being subjected to pressure, instead of the weight being gradually applied while the mortar was still green.

8. It is much to be desired that similar experiments should be made with harder bricks.

## Fluting Stone by Machinery.

A new process for smoothing, polishing and fluting stone by machine-power without the use of edge tools is now being tried in England. This process consists essentially in causing a revolving or reciprocating surface of iron to alternately bear against the surface of the stone to be worked, and then parted from it sufficiently to receive a layer of fresh sand and water between the rubbing

surface and the rubbed. The rubbing surface is held down by a spring, but at intervals is raised from the rubbed surface by an eccentric cam. For fluting and similar operations a series of round bars of wrought iron are mounted in bearings and made to revolve; at the same time they are given a reciprocating movement. The block of stone to be fluted is placed on a trolley and run under the bars. Sand is sprinkled automatically over the bars or rollers as they revolve. For recessing, edge molding, and similar purposes, rubbing disks are mounted on vertical spindles arranged to lift automatically for about half a revolution in every four. Several different types of machines are now in active operation. An advantage claimed for this process of working over hand labor with hammer and chisel, or machine-work where cutters are forced into the stone, is that the surface of the stone is left perfectly smooth and "unstunned," and better capable of withstanding atmospheric influences. It is stated that fluted, recessed and ornamental stone is now being sold by the inventors at 75 per cent. less than similar work produced by hand.

## TRADE NOTES

WE HAVE RECEIVED from the Inland Publishing Co. a copy of a new form of printed specification, which has been entitled "The New Departure." This specification practically omits the usual blanks for written insertions. The printed part is as solid and close as possible, and whatever writing may be necessary is relegated to the written portion, which also is made equally compact, being in the form of separate sheets. The condensation is obtained by cross references to portions of the printed work. The usual preliminaries under each department of work are omitted, with simply a reference to "General Remarks," included in the early part of the specification. In the same manner the special description of different classes of work is saved by a reference to the written pages. By this means the specification for an ordinary building is confined to less than half the space usually occupied where printed forms are used.

THE BARSTOW STOVE CO., with works at Providence, R. I., and offices No. 230 Water street, New York, and No. 56 Union street, Boston, have recently issued a dainty little pamphlet entitled "Fireside and Kitchen, Ancient and Modern." The book is an oblong, measuring 7½ inches by 5½ inches, is printed on excellent paper, and is handsomely illustrated by sketches representing, among others, the method of cooking game, suspended over an open fire, practiced by savages; an altar in the ancient temples of Israel; a portable stove such as was used in Pompeii and Herculaneum; a portable stove used by the Chinese and Japanese; a sketch representing the manner of heating the palaces of the ancient Romans; an open fireplace built in France in the fifteenth century; a fireside scene in New England, with various views of typical modern heating apparatus, including the view of a brick-set Barstow furnace in operation. The pamphlet, which, we believe, is for gratuitous distribution, is something that will well repay perusal.

THE NEW YEAR'S ADDRESS of the Boston Terra Cotta Co., with offices at 394 Federal street, Boston, was in the following terms: "With the opening of our sixth year as a corporation we wish to state that we are in a better position than ever before to meet the demand of the market for first-class terra-cotta. During the ensuing year, as heretofore, we shall give careful attention to the needs of our customers in New York City and Brooklyn, and any communication from you addressed to our office in Boston will be sure of prompt attention. With the compliments of the season, and hoping the coming 12 months will be prosperous ones for you, we are, &c."

THE RICHMOND WEATHER STRIP CO., Richmond, Ind., report business very active, and mention shipments to nearly all the Western States as well as a number of the Eastern States. They seem to have an article that is of special interest to builders, from the fact they have been in receipt of a large correspondence from builders since their goods were illustrated and described in our columns a few months since.

WE HAVE RECEIVED from A. L. Benedict, Asbury Park, N. J., a copy of his reduced price list on Benedict's Improved Rolling Window Screens. These goods were illustrated in our department of "Novelties" some months since. The leading feature of the screen is a Hartshorn spring roller, on which the screen rolls up like a shade. The edges are secured in pieces of grooved molding screwed fast to the side stop-beads of the windows, and the screen has the good quality of being as easily removed as the ordinary window shade. or it can be rolled up and left in place through the winter and let down the next spring when its services are again needed. The price list includes sizes adapted to nearly all ordinary windows. Prices are made on screens fitted with walnut or cherry moldings, and also with ash or pine moldings.

NOTWITHSTANDING the high duty placed on machinery shipped to Canada, it appears that citizens of the Dominion find it an advantage to buy machinery in the States. Three carloads and some extra pieces of machinery for furniture manufacturing have recently been supplied from Cincinnati to J. A. J. Craig & Co., of Montreal. The order was filled by the Egan Co., and is said to be one of the largest shipments made to Canada since the high tariff went into effect. The fact that Mr. Craig, who is a practical man, visited the United States for the special purpose of making selection, and finally placed his order with the company named, is justly considered a compliment to the character of machinery they manufacture.

WE HAVE RECEIVED from Messrs. John P. Pettijohn & Co., Lynchburg, Va., a very neat calendar for 1886. It measures some 3 x 6 inches, one-half of the card being devoted to monthly calendared sheets, and the other to the business card of the house issuing it. The printing is done in several colors, and the monthly sheets, in addition to the ordinary information given on calendars of this class, show the moon's phases.

THE CALENDAR issued by the Highland Foundry Co., of Boston, measures some 6½ x 9½ inches. The upper part of the card contains a handsome steel engraving representing an old-time fireplace, with andirons and various cooking utensils hung upon the crane. An antique fire-set and bellows, a candlestick and other accessories lend additional interest to the design, which is worked out in a very attractive manner. The calendar is of the yearly variety, and, although the type employed is small, is of a character to be very useful for both desk and office. The margins of the calendar are occupied by statements of the location of the Boston and Chicago houses managed by this company and the names of its principal officers.

TWO ILLUSTRATIONS contained in a card of the Dudley Shutter Worker Co., in another part of this number, show the advantages of means of closing shutters from the inside over the old plan of raising the window for the purpose. The article described has the advantages of being easily applied, not liable to get out of order, and adapted to work with any hinge in general use.

IN ANOTHER part of this issue the W. F. & John Barnes Co., of Rockford, Ill., direct attention to their foot and hand power machinery outfits for wood-working establishments. The object of the machinery described is to place contractors and builders who have no steam-power on as favorable a basis as possible to compete with larger operators. The assertion is made that with an outfit of foot and hand power machines made by this company a builder can do his own ripping, cross-cutting, scroll-sawing, mortising, tenoning, grooving, gaining, rebating, turning, &c., with a great saving over what he would be compelled to pay to planing mills. In addition he is put in a position to do work without waiting for others, and has the advantage of peforming it when and where it seems most advantageous to do it. A number of illustrations are presented by this company showing the machines and the work that they produce. The general presentation of the subject is supplemented by letters from those who have purchased tools.

CHARLES A. STRELINGER & CO., of Detroit, Mich., assert that, while they will not guarantee their "Thief Preventive" to cure a thief, they feel certain that it will in a very large measure prevent the attacks from coming on. Their thief preventive is of the nature of steel name stamps useful to every mechanic in marking the tools that he uses. A price list is furnished in their advertisement which will enable orders to be sent intelligently.

THE LITTLE GIANT MFG. CO., 233 Fifth avenue, Chicago, illustrate in another part of this issue Schofield's Little Giant clamp and combination tool in a form adapted for laying floors and clamping work for different purposes. This tool was illustrated among our Novelties some months since, and seems to be adapted for a very wide range of purposes. They also present Schofield's Little Giant portable mortising and boring machine. This tool is unique and of a character to be interesting to builders and woodworkers in general.

SPIRAL SCREW DRIVERS which drive screws into hard or soft wood simply by bearing on the end of the handle are greatly appreciated by mechanics who have employed them. The Decatur Coffin Co., of Decatur, Ill., show in another part of this issue an article of this kind which was illustrated among our Novelties some months since. The tool is carefully made, and possesses remarkable efficiency for certain classes of work.

THE SYRACUSE BOLT CO., Syracuse, N. Y., are directing attention to Barry's patent parlor-door hanger, which is claimed to be the only hanger that will not bind on an uneven track. The hanger is provided with wheels in pairs, so arranged as to bear on either side of a double track, and provided with adjustments that make it possible to take up as made necessary by setting and other variations in the work.

IN THEIR advertisement in another portion of this paper Messrs. William E. Uptegrove & Bro., of East Tenth and Eleventh streets, New York, direct attention to their supply of red cedar, adapted for lining closets and other purposes in house finish. They also mention quartered oak and cherry in thin strips for house finishing.

MESSRS. TOWER & LYON, 96 Chambers street, New York, are directing attention to a line of iron planes manufactured under Chaplins's patent. They claim for these goods simplicity of construction, prompt adjustments and beauty of style and finish. The clamp-plate and lever are nickel plated, the handles are of checkered rubber or of iron nickeled, as may be preferred. A price list of these tools appears in another column.

IN THE CARD of Goodell & Waters, 3301 Chestnut street, Philadelphia, with branch offices in New York and Chicago, there are shown several wood-working tools that are of interest to managers of planing mills and wood-working establisments generally. Among the specialties shown is a band-sawing machine, appropriately supplemented by a band-saw filing-machine and band-saw setting-machine.

THE STARRET COMBINATION SQUARE is a tool that has found many friends in the trade since its introduction. It consists of a sliding blade and stock having right angle and mitre faces. There is also provided in it a spirit level and a scribe, thus insuring these useful adjuncts close at hand whenever required. The tool can be used in many places that a stationary blade cannot enter. The article is described in a card of the manufacturer, L. S. Starret, of Athol, Mass., in another column of this issue.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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## NOTES AND COMMENTS.

IN response to our advertisement of the Seventeenth Competition, which appeared in the January issue, we received a very considerable number of studies. Almost every one, however, who sent a study complained of the shortness of the time allowed, and a great many of our friends wrote us explaining that under the circumstances it was impossible to take part in the competition, as they would have been glad to do had longer time been allotted. The time was shorter than we had intended it should be, owing to the fact that our January issue was delayed a few days in the printing, on account of the general disarrangement of our facilities incident to the removal, which has elsewhere been announced. Under the circumstances, assured as we are by a very large number of our architectural subscribers that such a course would please them, we have decided to extend the time in this contest. We have written each of the competitors whose drawings are at present in hand, allowing them to withdraw their present efforts for modifications or changes, or to let them remain in the competition as they are, whichever they please. The time is extended until May 5, which, calculating from the date this issue will reach our subscribers, will allow about two months for the work and shipment of drawings. The conditions remain the same in all other respects as expressed in the original advertisement in our January number. In another part of this paper we submit one of the studies received in this competition, which we publish by permission of the author. From the character of the work we have already inspected, and the considerable number of designs in hand, this contest would seem to be a popular one, and we anticipate for it a large measure of success.

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THE most recent reports received from architects in different sections of the country, both in large and small cities, go to strengthen the rather favorable opinion concerning the building business for the year which we offered in our January issue. A very large amount of repairing work or work in the character of repairing and alterations will be undertaken early in the season. The list of building permits in nearly all the cities will show an increase from this date forward, not only for residences, but for manufacturing establishments. The development of industrial activity is observed in various directions. A considerable number of shoe factories, for example, are projected in several of the Western States. Furniture factories are also springing up throughout the West, and works for the supply of electrical apparatus are not far behind. Electric light is called for in scores of towns, and it is quite probable that many of them will succeed in securing it. The encouragement that has been given during the past six months has started an army of enterprising men, with capital large or small, to seek new opportunities in new localities. Other manufacturing industries also show signs of activity. These enterprises are laying the foundation of expanding markets for all kinds of materials, and the builder will come in for his share of the work.

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ONE of the most successful efforts in the direction of industrial training at present in progress is that of the Manual Training School of Chicago. The efforts of this institution in the direction of training young men have attracted wide attention, and in some respects other institutions have copied the methods employed. A short time since, at the close of the winter term, the doors of this institution were thrown open to the public, and the interesting work done by the students was inspected by a large throng of people during a day and evening. The occasion was made doubly interesting by the fact that the machinery was kept in motion and the students at work, thus exhibiting methods as well as results. This institution, as well as others of its kind, is doing a great work in developing a taste for mechanical pursuits and helping boys to acquire a practical knowledge in the use of tools and machinery which will have a value in almost any trade. Those who inspect the results are always surprised that such creditable work can be done by amateurs. The whole process of instruction is object teaching, on a larger scale, of course, than is adopted in the public schools with children, but still in effect a higher development of the same idea.

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THE present controversy over subterranean electric wires in our large cities has drawn attention to the fact that the original invention of Morse did not contemplate anything but underground lines. Aerial wires were used as a matter of necessity where it was impracticable to bury them. Speaking on this subject, one of our engineering exchanges says: "The ground connection of the original Morse telegraph line between Washington and Baltimore, U. S. A., was an elaborate matter, consisting of plates of copper 2 feet wide and 5 feet long, the one at the Washington terminus being buried in a pit excavated under the cellar of the Capitol, and that at the other end being sunk in the harbor at Baltimore. The wire was insulated and laid in lead tubes in sections of 60 feet, and wound upon a drum. A plow designed for the purpose by the present foreman of the Baltimore and and Ohio Railway made a furrow 2 inches wide and 20 inches deep, and the wire leading from the drum on the plow, down through the plowshare, was buried as the plow was drawn along the line of the railway by eight yoke of oxen. As each section of 60 feet was buried a plumber would solder on a new length of wire. When the stone viaduct at Relay Station was reached, it was out of the question to disturb the masonry for the purpose of burying the wires, and they were strung upon poles as an expedient suggested by some laborer unknown to fame. In the course of the tests it was found that the insulation could not be maintained on the first section of 9 miles of underground wire, and therefore a second line was strung from poles, completing an aerial line for the whole distance. Although that was in 1843, the people along the route made objections similar in spirit to those offered against the early railways in England. By a confusion of terms in the popular mind, phenomena similar to lightning, although conceded to be somewhat less in violence, were anticipated. It was claimed that the birds of the air and beasts of the field would be killed; that buildings would be burnt and property injured—nay, it was even expected that trees and vegetation would be blasted, and nothing could have defended it but the strong, protecting arm of the friendly railroad corporation, who had given to Professor Morse the right of laying the telegraph wire along their right of way, conservatively, in the words of the original vote of the Board of Directors, "reserving the right of discontinuing its use if upon experiment it should prove in any manner injurious."

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MANY towns and cities are considering sanitary codes and plumbing regulations. The necessity of controlling important matters governing the health of the community is generally appreciated, and accordingly the question of the means to be employed comes up for consideration. As a rule, we think, plumbing codes are too comprehensive, and that they deal with many unnecessary details. If boards of health assume the responsibility for all plumbing-work in new buildings, rascally contractors can take advantage by claiming that they have fully complied with the law, and that their responsibilities cease whenever the Health Board or plumbing inspector has approved and passed the work. A plumbing code often becomes in the hands of unscrupulous contractors or speculators a means for defeating the ends sought for by the enactment of the law. The more varied and complex the requirements of plumbing regulations, the greater the certainty of their being evaded when they conflict with the selfish interests of those whom they affect. It would seem, then, that the better plan is to simplify sanitary codes, by restricting them to a few requirements, easily understood, but not easily evaded. The question is one in which architects and builders ought to be especially interested, for, whatever regulations are adopted in a community, they have some influence in the arrangement and construction of the plumbing-work in the buildings under their control.

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THOSE of our readers who recall the will of the late Wm. H. Vanderbilt may remember that he gave $500,000 in lump for new buildings for the College of Physicians and Surgeons, in this city. The plans for these buildings have recently been filed. The buildings are located on Fifty-ninth street, near the Roosevelt Hospital. The college is to have three wings, with a uniform hight of four stories. The front on Fifty-

ninth street will have a total length of 140 feet. The middle building, or wing, will be 55 feet, and the rear building 140 feet long. The buildings will be in the shape of a T, and their cost is estimated at $250,000. Plain brick is to be the material. Commenting on the plans for this structure, one of the daily papers notices that there is not the least attempt at fire-proof construction. In fact, the plans were so carelessly prepared that they were not accepted by the Building Department until after modifications had been made. The Superintendent of Buildings insisted upon changes that would render the flues more secure, and he also added that brick walls should be put around the elevators and dumb-waiters everywhere. Room is made in the basement for "subjects," for workshops, engine, &c. On the first floor are the big lecture hall, the faculty rooms, students' studies and a chemical laboratory; on the second floor an anatomical museum, professors' quarters, pathological rooms and the amphitheater that extends into and through the third story. On the third will be Swift's museum, and in the fourth story the dissecting-rooms. The erection of the building will be begun without delay.

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SIR E. BECKETT some time since gave the following advice to young architects: "If we were starting a young architect on his career, what should we advise him? If his object is to make money as soon as possible, no doubt there are ways better known to architects than I can pretend to teach. But if his object is to make good buildings, and gradually to make a lasting name and reputation, though perhaps very slowly, I should think the humblest and most prosaic course would be the best. I should say, dismiss all grand ideas of new styles and the 'poetry of art' and the 'philosophy of architecture,' and all that kind of thing, and, whatever you do, don't call yourself an 'artist.' An artist is a man or woman who executes, whether he more or less designs besides, and ranges from Phidias and Apelles down to a singer, a dancer, a cook or hairdresser—all excellent things in their way—but no good ever comes of confusing well-understood terms. You are artists in respect of your drawings, but not in respect of the buildings made from them, and experience has long enough shown that there is no connection between the power of drawing nice architectural pictures and the power of producing fine buildings. All the fine talking in the world cannot and need not make anything better of an architect than a designer of buildings, as every man of common sense knows that he is. If he chooses to paint or carve besides, he would therein be a painter or a carver, but an architect not a bit the more or less, just as a lawyer may also be a painter or a mechanic. I should next say, when you have a building to design, make up your mind, unless it is made up for you, in what known style it is to be—bearing in mind always that it is hardly possible for any man to design with spirit in styles so opposite in their principles as classical and Gothic, and, accordingly, no architect of any fame willingly does so, and it is a pity when they do it unwillingly. Then simply set to work to design what you think will in the long run look the best—not the most original, or the most fashionable, or the most of anything, except the best. If your employers will not have it, do the best you can either to convince or to satisfy them by such alterations as will also best satisfy yourself. But if you begin to ride the high horse, and tell them in effect that they are fools, they may not be too foolish to reply that they are spending their money to please themselves, and not you. In the long run you will have pretty much your own way, and quite as much as most people have in this world."

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SOME of the famous staircases described by travelers and historians, in dimensions and general magnificence so far excel anything to which designers and builders ordinarily have access that it is almost impossible to picture to the imagination the features of the work. Some staircases which are specially noteworthy on account of their dimensions occur in the palace of Persepolis. One staircase leads from a plain in the beautiful valley of Bendamir to the summit of a terrace, out of which it is taken. It consists of two sets of two flights of stairs, each with a broad landing stage between them; the two lower flights diverge to the level of the foundation, the two upper converge to a common landing place at the top. The shallowness of the pitch, each stair being only 3 or 4 inches in hight, constitutes an ascent so easily graduated that horses may be ridden up and down, while the width of 22 feet admits of a calvalcade of 10 abreast. Less noble in size, but distinguished by the character of its ornamentation, is the next staircase which opens to the view, somewhat out of line, when that just described has been mounted. It conducts to the summit of the central terrace, and is composed of four single flights, two of them being central and facing each other, the other two standing on either side of these at about 21 yards distance from them. The entire length is 212 feet, the width 16 feet, and there are 31 steps in an ascent of 10 feet. It is flanked by an immense parapet wall, surmounted by a massive rounded coping of elegant carved work, which overlaps the wall on the inside; the ends and the entire face are covered with sculptures, and exhibit a long procession of colossal guardsmen armed with spears.

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THE common practice in the letting of building contracts in this country is for the builder to assume all the responsibility for quantities, taking the same from the architect's drawings. A schedule of quantities is very seldom attached to an architect's specification, although for many reasons it would seem to be an appropriate part thereof. In Great Britain matters of this kind are managed differently, and yet the system that is in vogue there does not seem to be altogether satisfactory. Many abuses are claimed to exist and various suggestions for their abatement have been made. Mr. T. H. Wyatt, an architect of eminence, in writing upon this subject makes some radical suggestions, which no doubt will afford food for thought to many of our readers. He says: "I believe that the simplest and most satisfactory arrangement would be to disconnect the surveyor from the builder, to make him (on the nomination of the architect) the agent and adviser of the employer in the matter of quantities, as the architect is in matters of arrangement, taste, construction and decoration. That he should take out the quantities from the architect's drawings on his own responsibility; that he should be paid by the employer instead of by the builder (half on the completion of his quantities and half on completion of the work and settlement of account). That the priced bills of quantities should be attached to and form part of the contract, as much as the drawings and specifications, and, when signed and sealed up, should not be referred to again till necessary to making up the accounts, except with the consent of both parties; that the builder should not be held responsible for the execution of any works not included in these quantities, and for which naturally, as they have not been included in his priced bills of quantities, he has not been paid; but that, on the other hand, he must be held responsible to execute (or to have deducted from his bill in making up the final account) any portion of the work included in the quantities which he has not executed. We should thus, I think, have a fair guarantee that only the actual quantity of work shown on the drawings was included in the quantities, and thus the cost of our works would not be unnecessarily swelled. The employer would be fully protected, for as long as his architect and his surveyor were honest men he would only pay for work actually executed, and there would be no margin taken to cover unknown contingencies. I have adopted this system in my own practice, and can scarcely imagine, though I should be ready to hear, any practical objection that can be urged against it. I can conceive nothing more unjust or more opposed to the spirit of equity than to require a builder to take the quantities as they come from your surveyor, denying him the right to appoint a surveyor to verify on his part the accuracy of those quantities, and yet to bind him in a contract to execute all the works shown on a certain set of drawings, and described in a given specification; though many of the items may have been omitted in the quantities you force him to take without guaranteeing their accuracy."

## THE PLATES.

Plates IX and X contain the perspective view and elevations of "Ko Ko's" study in house designing, submitted in the Seventeenth Competition, reference to which will be found on page 50.

In Plate XI we present some studies in furniture, submitted by Mr. J. W. H. Watts, of Ottawa, Canada. The subjects include articles that are of interest to all cabinet makers.

In Plate XII we present a study sent us some time since by Messrs. U. S. Wicks and F. R. Fuller, of Ithaca, N. Y.

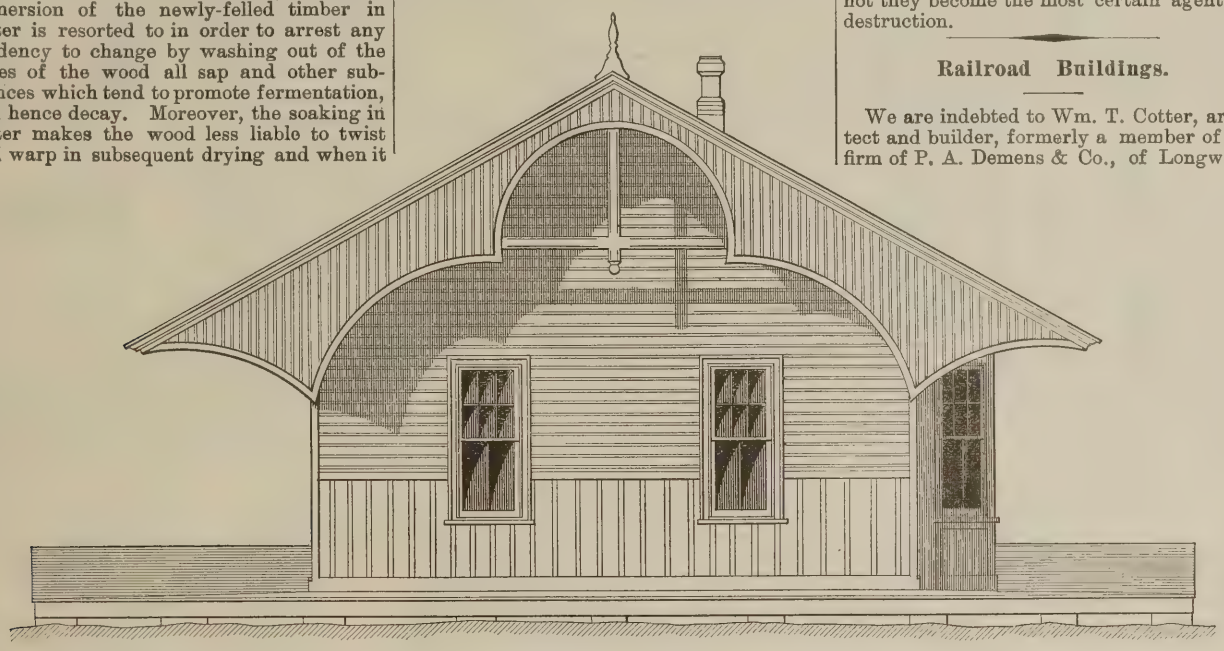
### Breakage of Band-Saws.

Concerning the breakage of band-saws the London *Timber Trade Journal* says that among the most frequent causes of breakages the following may be named: The use of inferior blades; unsuitable gauge for the size of saw pulleys; pulleys of machine being of too small a diameter; pulleys being out of balance or too heavy; the use of improper tension arrangements; saw running on a hard and unyielding covering of saw pulleys instead of rubber bands; not slackening saws after use, thus preventing the free contraction of the saw blades on cooling down after work; the framing of machine column being of too light a section or too high, thus causing excessive vibration; joint in saw not being of same thickness as the rest of the blade; imperfect guides above and below the table; improper method of receiving the back thrust of saw, consequently case-hardening the back of saw blade and cracking same; using band-saws with angular instead of with rounded gullets at root of teeth; top pulley overrunning saw; working dull saws; feeding up work too quickly to the saw; allowing sawdust to collect on the face of saw-wheel, thus causing it to become lumpy and uneven; operating too heavy a band-saw with too heavy a top wheel; stopping or starting a machine too suddenly, especially while using a light blade, will almost certainly snap a saw in two. When it is considered that a band-saw will run from 6000 to 9000 lineal feet per minute for days and weeks, and even months straight off, without breaking, and when the incalculable number of times that a saw bends over the two pulleys and then straightens out again is taken into consideration, it is surprising that band-saws do not break oftener.

## Seasoning Timber.

The following *résumé* of methods in vogue for seasoning timber is from the pen of H. C. Seddon, one of the Royal Engineers, and will interest our readers:

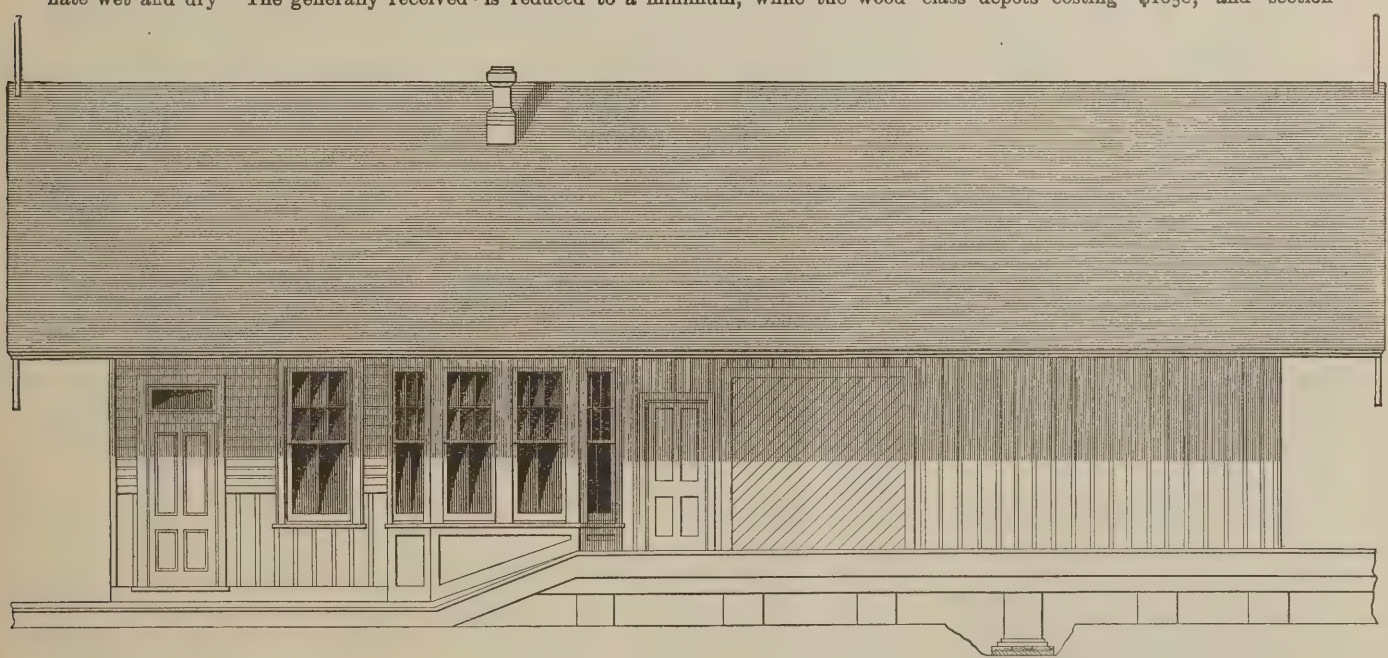
Though air-drying is the best and most certain way of promoting durability in wood without impairing its strength, the time it takes is often a great drawback; hence the immersion of the newly-felled timber in water is resorted to in order to arrest any tendency to change by washing out of the pores of the wood all sap and other substances which tend to promote fermentation, and hence decay. Moreover, the soaking in water makes the wood less liable to twist and warp in subsequent drying and when it is cut up into scantlings for use, besides rendering it more proof against the attacks of worms, though its strength is supposed to be slightly diminished thereby, which seems to be borne out by the fact that the loss of weight is greater in water-seasoned wood than when it has been merely air-seasoned. If placed in water it is better that it should be completely submerged, as nothing is so injurious to timber as being exposed to alternate wet and dry The generally received opinion is that for ordinary purposes a fortnight's immersion in running water is sufficient, though much must depend on the size of the balks so treated. M. de Lapparent, one of the Government inspectors of timber in France, recommends for timber used in shipbuilding one year's immersion in river water, two years in fresh or three in brackish water, constantly being changed, to be followed by two years of air-seasoning. The gradual processes of air and water seasoning are the only ones which can be safely applied to timber in large scantlings; still, artificial drying may often be successfully employed in the case of smaller scantlings, more especially in the preparation of timber for joinery, for which purpose it should be quite dry and free from any tendency to shrink. Among such systems we may mention drying in ovens or hot chambers exposed to currents of air ranging from 90° for hard woods and large sections to 200° for soft woods in thin boards, the process being carried on until the wood has lost from one-fifth to one-third its original weight, according to the purpose for which it is required to be used. Boiling and steaming wood for three or four hours are often resorted to, as the subsequent drying is thereby rendered very rapid, and the tendency to shrink and twist is reduced to a minimum, while the wood becomes so pliable that ribs and planks can be bent to any required curve, and, if confined until dry, will readily retain the form so given them. Smoke-drying may also be employed at times with advantage; but carbonizing or charring the outer surfaces of the wood, though very effectual in preserving it from the destructive influence of alternate wet and dry, such as the ends of posts let into the ground are so much exposed to, must never be regarded as a substitute for seasoning; for, though keeping out external moisture, it effectually imprisons that which is in the pores of the wood, and so hastens internal decay. While on this subject it may be as well to observe that paint, tar and all similar water-proof coatings are only preservatives so long as the timber is already seasoned and free from moisture, as then they keep it dry; but if not they become the most certain agents of destruction.



*Combined Freight and Passenger Depot of the Second Class, S. F. R. R.—End Elevation.—Scale, ⅛ Inch to the Foot.*

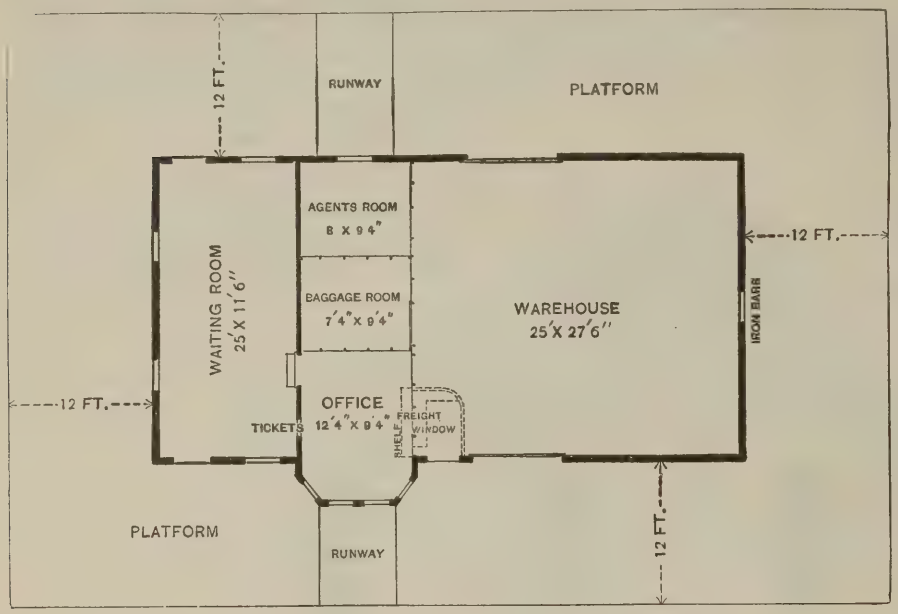
## Railroad Buildings.

We are indebted to Wm. T. Cotter, architect and builder, formerly a member of the firm of P. A. Demens & Co., of Longwood, Fla., and now of Sanford, Fla., for complete sets of blue prints of railroad buildings now in course of construction on the Pemberton Ferry branch of the South Florida Railroad. The work is being done under the immediate supervision of Mr. Thomas L. Morton, construction engineer. The drawings include what are known as "first-class depots," which are being built by Messrs. P. A. Demens & Co., at a cost of $2416, second-class depots costing $1650, and section-houses costing $615, each with various outbuildings. We present engravings of a second-class depot herewith, together with details of portions of the work. The second-class depot differs from the first-class only in the size of the building and its arrangement, the general features being practically identical. These drawings are a desirable addition to the railroad buildings already presented in our columns. In design and con-



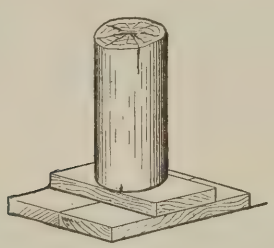
*Side Elevation of Second-Class Depot.—Scale, ⅛ Inch to the Foot.*

struction these buildings are of interest to those engaged upon similar work in various parts of the country. Locality and the character of the material available exert an important influence upon both design and




*Combined Freight and Passenger Depot.—General Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.*

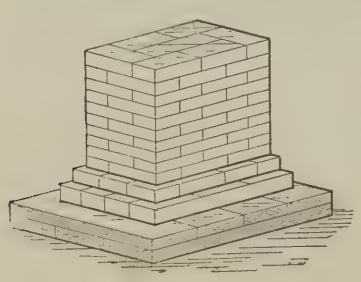
construction of buildings of this kind. Accordingly, what is best adapted for Florida and the South would not necessarily answer for the Northwest. We shall be glad to



*Wooden Piers.*

have some of our correspondents in the western part of the country give us particulars concerning such buildings as are employed along the new railroads in that section It is by comparison of ideas in this way that the best results are to be obtained.

A very large amount of the stone used for flagging in New York City comes from what is known as the "Bluestone Country," lo-



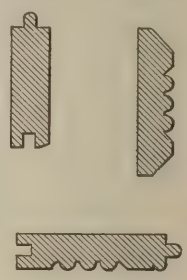
*Brick Piers.*

cated in the counties of Pike, Pa., and Sullivan, N. Y. A number of the more prominent quarries are situated between Port Jervis and Hawley, and others between Narrowsburg and Callicoon. It is said that upward of $1,000,000 worth of bluestone is shipped from these quarries annually. It was from this source that the pavements in front of the residence of the late Wm. H. Vanderbilt were derived. This pavement was made up the of the largest slabs of flagging stone ever put in a pavement. The stone was taken from the quarries in Pike County, just west of Port Jervis. The largest slab, being that immediately in front of the entrance, was the biggest piece ever transported from the quarries, and cost $9000 alone. The entire pavement is said to have cost $40,000.

## Ventilation of Private Dwellings.*

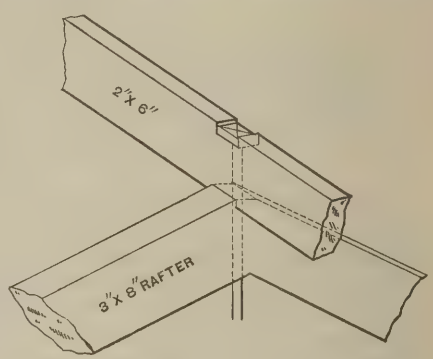
Mr. Blagrove, having described the constitution of the atmosphere and the conditions affecting differences of density between fresh and foul air, proceeded as follows:

If we suppose the fresh air to be introduced from the lower part of a room, while the foul air finds an exit at the ceiling level, we shall see that it might be possible to keep the supply practically pure. To my mind, the problem of perfect ventilation depends upon two conditions: the rate at which the foul air ascends, and the rate at which it is diffused. If the velocity of diffusion were equal to the velocity of ascent, the air below the level of our nostrils would never be contaminated by our breath, which would be constantly replaced by perfectly pure air. The capacity of outlet tubes was described as dependent upon the velocity of the outflow, which was governed by the difference of temperature between the foul air and the surrounding atmosphere, and, in fact, varied directly as the square root of that difference. With an average difference of 3° in a tube or flue 10 feet long the velocity would be about 5000 feet per hour; or an outlet of 1 foot superficial capacity would extract enough for 10 persons, allowing 500 feet for each.

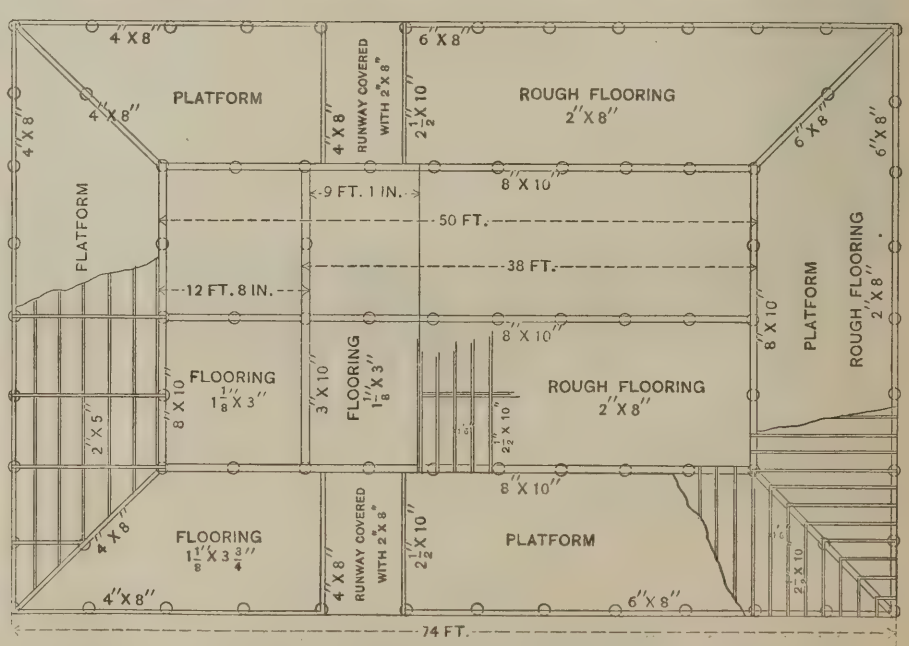


*Wainscot, Joint-Mold and Ceiling.*

There should, said the speaker, be outlets in or near the ceiling. If you put your outlet at any level below the ceiling you will have a constant stratum of foul air down to that level, and it will be liable to pollute the remaining air of the room. There may be any number of outlets, which may take the form of ornamental perforations, but they should all communicate by outlet tubes with one flue carried up the wall. If you have two or more extraction flues to the same room there is always the danger of a down-draft being established in one of them, through differences of atmospheric pressure.



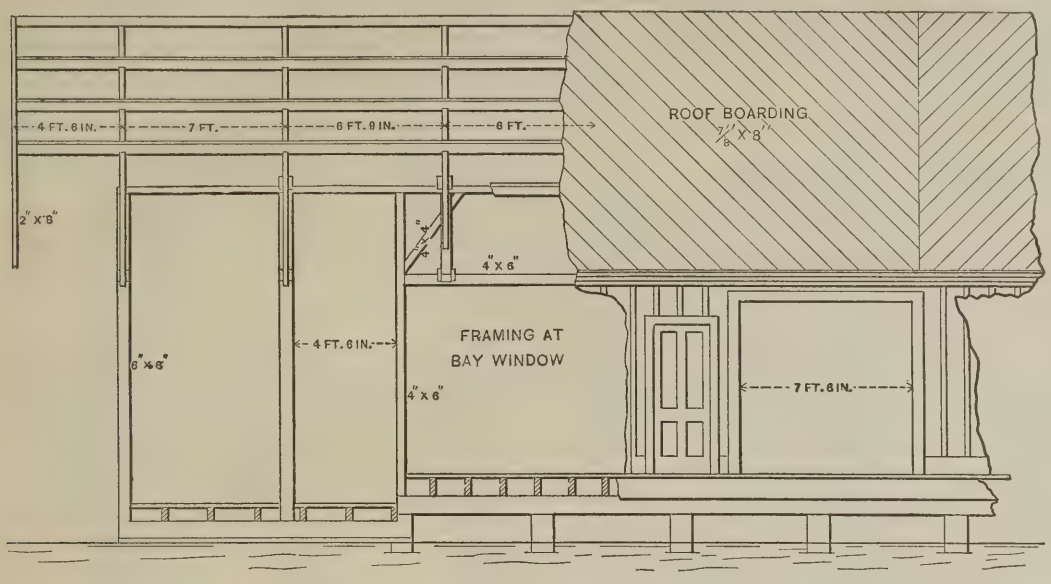

*Intersection of Ridge Purlin and Rafter.—Scale, ¾ Inch to the Foot.*



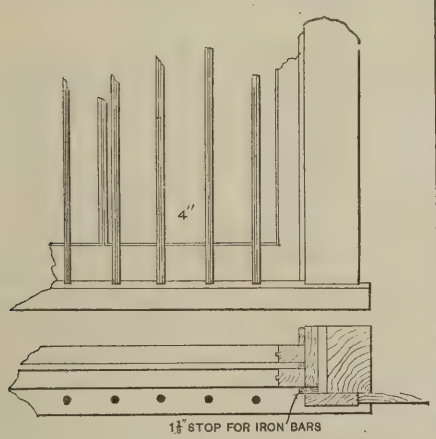

*Framing and Pier Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.*

* A paper by Mr. G. H. Blagrove, read before the Architectural Association of Great Britain.

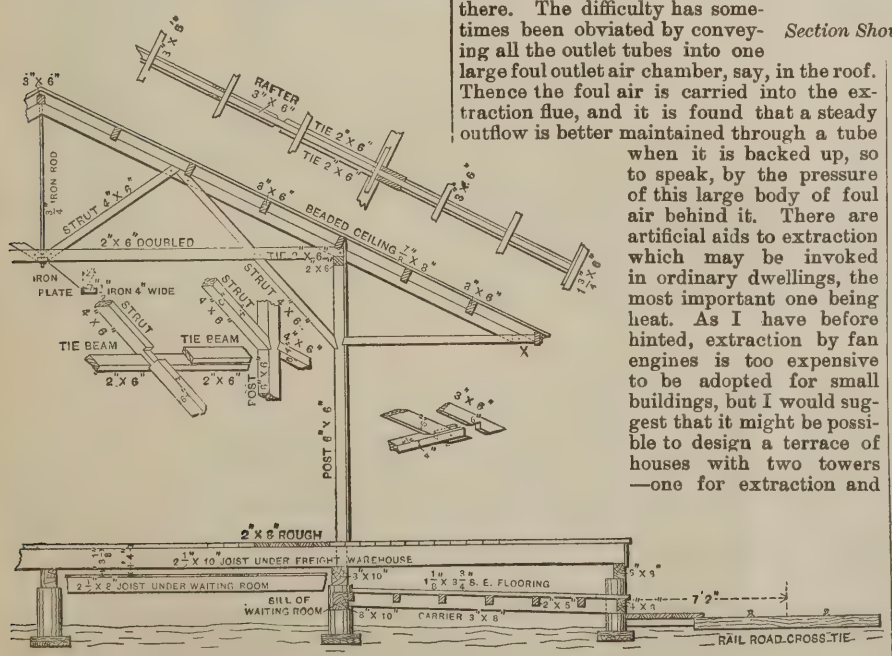
In order to maintain a constant up-current in an extraction flue the flue must be carried down below the level where the foul air enters it to some point where cold air can be admitted. This can easily be done in external walls by means of gratings. In internal walls the flues may be carried down to a cellar in the basement, into which air can be admitted through tubes or gratings.




*Combined Freight and Passenger Depot.—Elevation of Framing.—Scale, ⅛ Inch to the Foot.*




*End Window, with Bars.*

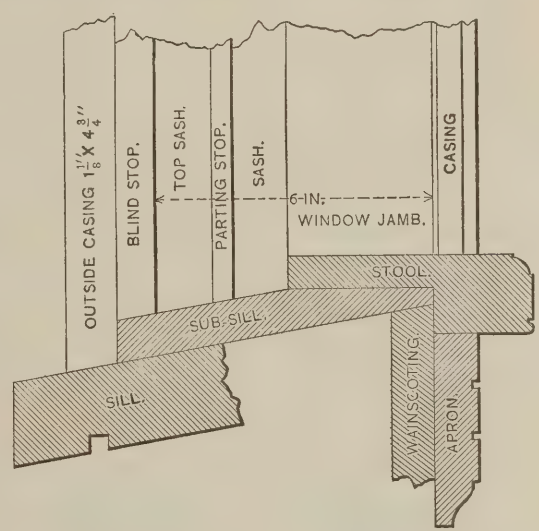



*Sectional Elevation, Illustrating the Framing.—Scale, ⅛ Inch to the Foot.*

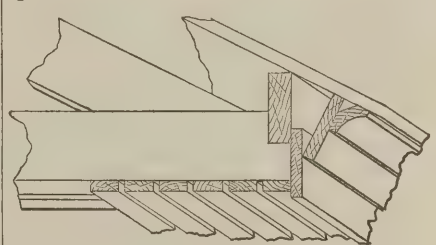
We should then consider that a column of air equal in hight to the entire atmosphere is pressing upon the opening at the lower end of the flue, while a column of the same hight, minus the hight of the foul air in the flue, is pressing upon the top, the result being an up-current. I have known extraction flues closed at the top and provided with side gratings only. This I conceive to be a mistake, as the air blowing in through this grating may acquire a downward direction, checking the up-flow of foul air. There should always be a vertical opening, for there is no apparent reason why foul air should behave differently to smoke, and its upward passage may be assisted by means of louvered gratings let into the sides of a stack. Boyle's or other extractors are undoubtedly useful. Their operation depends upon the principle that a current of air blowing across an opening causes a partial vacuum which creates an up-current, as exemplified in the well-known apparatus for diffusing scent by means of two glass tubes; but, of course, no dependence can be placed upon these extractors in calm weather.

There is always a danger of foul air being retarded in its passage to an extraction flue by the pressure of cold air already there. The difficulty has sometimes been obviated by conveying all the outlet tubes into one large foul outlet air chamber, say, in the roof. Thence the foul air is carried into the extraction flue, and it is found that a steady outflow is better maintained through a tube when it is backed up, so to speak, by the pressure of this large body of foul air behind it. There are artificial aids to extraction which may be invoked in ordinary dwellings, the most important one being heat. As I have before hinted, extraction by fan engines is too expensive to be adopted for small buildings, but I would suggest that it might be possible to design a terrace of houses with two towers—one for extraction and one for supply—which might be made pleasing architectural features. Sometimes extraction flues have been carried up inside a large kitchen flue. When the kitchen is placed at the top of the house, as recommended by Dr. Richardson in his "Hygeia," the heat of the kitchen fire can be utilized for warming the upper extremities of the extraction flues and increasing the current in them. An outlet tube should never be conveyed into a smoke-flue, partly on account of the danger of the smoke being occasionally driven back into the room, but chiefly because the outlet tubes may become partially choked with soot. If the smoke-flues were carried down to a ventilation cellar in the basement the up-current in them would be greatly increased, to the probable prevention of what is termed "smoky chimneys." The current could always be reduced, if necessary, by partially closing the register. The chimney could be swept from above with a sweep's brush let down by a rope, and all the soot would pass into the cellar instead of into the room. I am told that this plan is adopted in Berlin.

With regard to the introduction of fresh air into houses, this forms perhaps the most difficult part of our subject, on account of the dangers arising from drafts when no special means are adopted for warming the inflow. To insure the greatest possible purity of supply the air should not be admitted very near the ground; therefore, for ground floor and basement rooms it is advisable to provide inlet flues. Any tubes or grating used for this purpose ought to be of galvanized iron or some material not liable to rust, because in the process of rusting oxygen is absorbed from the air. We ought to consider the true nature of what is called draft in deciding how fresh air is to be introduced into a room. So long as the air is colder than the surface of our bodies it will absorb heat from them, and while the air in contact with our bodies is continually

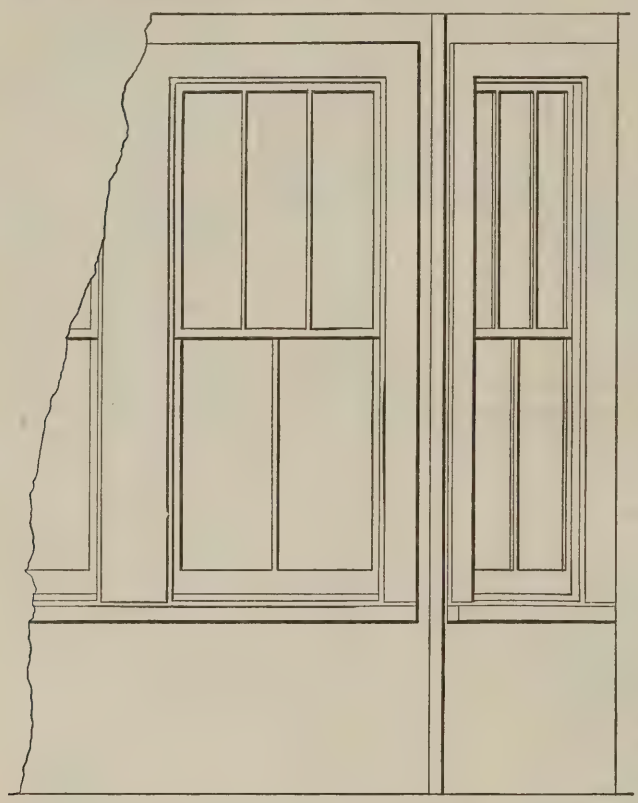



*Section Showing Exterior and Interior Finish of Windows.*

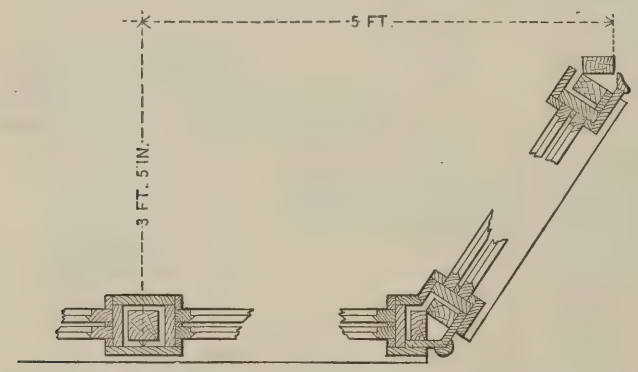


*Finish at Eave.—Scale, ¾ Inch to the Foot.*

being changed it continually presents fresh capacity for absorbing heat. This is why air at, say, 60° in motion may really feel colder to us than air at 40° when at rest. If, therefore, there is to be a certain amount of motion set up in the air of a room, the more that motion is distributed the less will it be felt. Hence, if we place the outlets in the highest part of a room we ought to place our inlets in the lowest part.



*Half Elevation of Bay Windows.*




*Combined Freight and Passenger Depot.—Half Plan of Bay Window.—Scale, ½ Inch to the Foot.*

Mr. Blagrove then gave his ideas as to the best method of introducing fresh air through a number of small openings filled with wire gauze, in the skirting of the room, the supply being controllable by means of a choke-valve. The concluding portion of the paper contained the following observations:

There are some other methods of introducing fresh air, to which I should like to call attention. We are all tolerably familiar with the simple device of putting a bead of extra depth to a window-sill, which enables the lower sash to be raised so as to admit the air only between the meeting rails. An ingenious contrivance has recently been patented by Mr. W. Pope for converting the cased frame of a sash into a ventilation flue. The air is admitted between a set of louvers placed in the lower part of the pulley stile outside, and it enters the room through another set of louvers in the upper part on the inside. The outer louvers are so arranged that they can be partly or entirely closed by turning a small knob inside. Mr. Pope calls this "pulley stile ventilation," and it is obvious that it could be introduced into any house without much difficulty or expense. A method of so-called ventilation by diffusion has been mentioned. It consists in fixing fine gauze in an opening, so that a constant interchange between the external and internal air is carried on, it is said, without perceptible draft. If a proper outlet is provided in a room containing a fireplace it will be found that a considerable amount of cold air will rush down the chimney; and if there is any other means of supply it may be advisable to close the register when no fire is lighted. Otherwise I would suggest the use of a species of chimney-board, which would be, in fact, a frame filled in with fine wire gauze or perforated zinc. By this means the inflow would be distributed and its velocity diminished. When a fire is burning a warmed supply might be obtained by converting the jambs of a chimney-piece into a species of Tobin tubes. I do not regard the Tobin system as thoroughly satisfactory. It appears to me that by directing the current of fresh air toward the ceiling, whence it is afterwards diffused, the inflow is at once mixed with the foulest air in the room, which it chills, condenses and brings down with it. If the inflow does not maintain its upward direction an unpleasant draft is felt by those who happen to sit near the ventilator. This is the case with hopper ventilators, or with top lights hinged to casement transoms, even when furnished with side gussets. I have seen hopper ventilators very artistically treated by having pictures or ornamental mirrors placed in front of them and tilted forward at the required angle. This mode of decoration is applicable to the Sherringham ventilator, which can be partly or entirely closed at will. When the supply is warmed such means of inlet are satisfactory enough, and might be made available for ventilating rooms from halls or corridors, where the air is tolerably pure, especially when the products of combustion from artificial lights are carried off by special tubes, as was done in the Sanitary House at the Health Exhibition.

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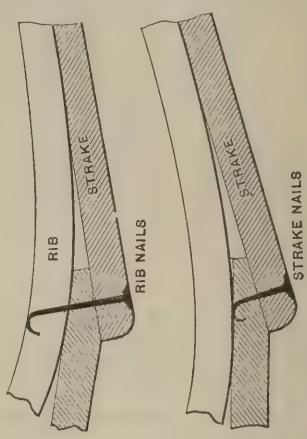
The amplitude of the oscillation of chimneys has been exactly measured by observation of the shadows cast by the sun upon the ground. Recently, the oscillations of a chimney 115 feet high and 4 feet in diameter externally at the top, near Marseilles, France, were observed by the shadow during a high wind to attain a maximum of 20 inches. It was estimated that the chimney, deflected by an initial impulse, would have made four or five oscillations before returning to a state of rest. On the contrary, by a succession of impulses isochronous with the oscillations, a chimney may finally be overthrown. Such is the explanation of the destruction of certain chimneys, in which, nevertheless, all the conditions of statical stability were fulfilled and which appeared to be perfectly sound.

## Boat-Building for Amateurs.

BY H. L. CAMPBELL.

To the amateur who has a taste for aquatic recreation there is probably no mechanical occupation so interesting as that of boat-building, but as professional boat-builders are rather chary about giving information in regard to their work, and books relating to the subject have heretofore been very expensive and difficult to procure, the amateur who has attempted to build his own craft has found such a great number of obstacles in the way of a successful termination to his labors that he has ofttimes given up in disgust before the work was fairly commenced, and reinforced the kindling pile with a varied assortment of barrel hoops and mutilated pieces of lumber. Bearing this in mind, we will endeavor to explain the principles that govern the designing of boats in general, together with the mechanical manipulations necessary to build them successfully in such a manner that any one possessed of a fair amount of mechanical ingenuity and tolerably handy with tools can design and build a boat that he can regard with satisfaction when it is completed. The character of the waters in which a boat is to be used should in a great measure govern its design, as a boat intended for deep and rough water would hardly be suitable for a broad, shallow river, or for marshy places where the tide ebbs and flows. For the latter there is probably nothing better than the old-fashioned punt, with flat bottom and straight sides, as it draws very little water and can be dragged over wet grass and mud quite easily. The shallow bays on Long Island Sound have been the means of improving the punt till it has reached perfection in the form of the sharpie, a sailing-boat with overhanging stern and fine bow, and which can hardly be improved upon for sailing in smooth and shallow water.




*Boat-Building for Amateurs.—Fig. 1.—Two Examples of Lapstrake Construction.—Half Size.*

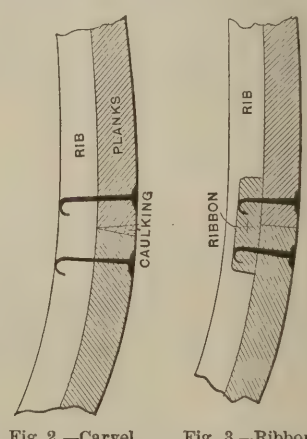
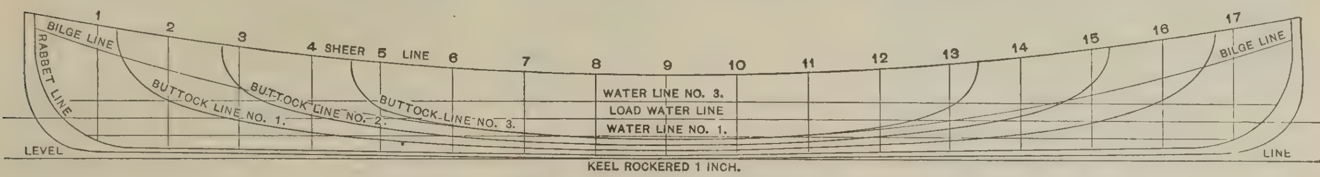



Fig. 2 —Carvel. Fig. 3.—Ribbon Carvel.

*Methods of Construction.—Half Size.*

As the construction of flat-bottomed boats is not very difficult, we will pass them by

for the present, and select as the subject of our illustrations a type of boat in common use among the fishermen on the Great Lakes, which for strength, safety, bouyancy, lightness, ease of management and general all-around purposes cannot be excelled. These boats are generally known as "clinkers," a corruption of the word "clincher," which




*Boat-Building for Amateurs.—Lines for an 18-Foot Clinker Boat.—Fig. 6.—Sheer Plan.—Scale, 3/8 Inch to the Foot.*

alludes to the manner in which they are built, the planks or "strakes" being lapped over each other like the clapboards on a house, and nailed through and through, the nails being "clinched" on the inside; hence the name. This form of construction is properly called "lapstrake" or "lapstreak" (Fig. 1), and is probably the best method of constructing small boats, the other methods

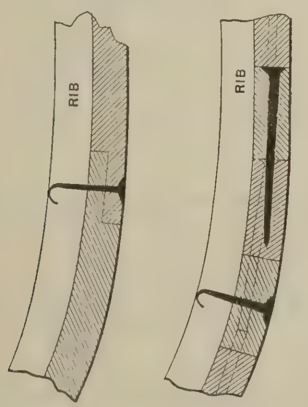



Fig. 4.—Shiplap. Fig. 5.—Strip Laid.

*Methods of Construction.—Half Size.*

being "carvel" (Fig. 2), "ribbon carvel" (Fig. 3), "shiplap" (Fig. 4), and "strip-laid" (Fig. 5). In the "carvel" method the planks are laid edge to edge and nailed to the ribs close to their edges, the joint being afterward filled with a thread of cotton run in with a knife or small tool designed for the purpose. This method is the one principally used for all large boats and vessels, but as all the ribs have to be set up before the planks are nailed on, and as considerable skill is required to make the joints or seams between the planks perfect, it is not a very good method to use for boats with the planking less than 5/8 inch thick, as planks thinner than this are liable to spring between the ribs. The ribs must also be made heavier, as they take all the strain of holding the boat together. The planks must also form a close joint on the inside and be slightly open on the outside, to allow the calking material to be introduced easily and prevent it from being shoved through.

The "ribbon carvel" method is similar to

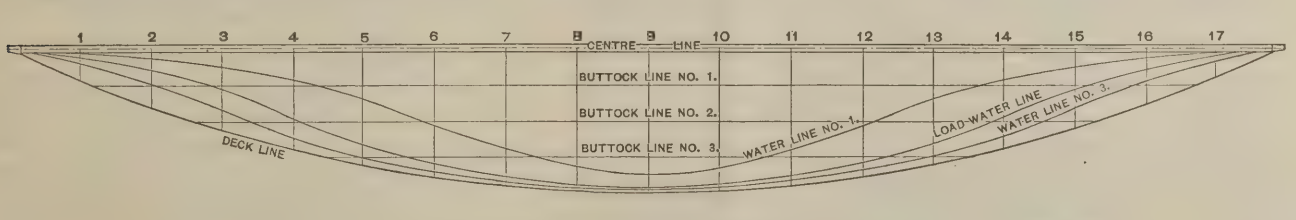



*Fig. 8.—Lines for an 18-Foot Clinker Boat.—Half Breadth Plan.—Scale, 3/8 Inch to the Foot.*

the carvel, with the addition of a ribbon or batten laid along the joint on the inside, both planks being nailed through it and the nails clinched on the inside; sometimes the ribs are placed next the planks, as in the carvel, and the ribbons cut in between them. This method does away with the necessity of calking, and is stronger than the carvel, but it requires just as delicate workmanship, and is heavier than either it or the lapstrake methods. In "shiplap" construction the planks are rabbeted half their thickness the width of the lap, and nailed through and through, the nails being clinched on the inside. This method is lighter than the lapstrake, and gives a smooth surface inside and out, but it is weaker and requires very skillful handling with thin planks.

In "strip-laid" construction the planks are about 1 inch wide at their widest part, and taper toward each end. They are laid edge to edge and nailed through and through edgewise, from 2 to 3 inches apart, the nails being long enough to pass nearly through two strips. This makes a heavier boat than any of the other methods, as it requires so many large nails, but the principal objection to its use is that it is almost impossible to replace a broken strip, on account of the intricate manner in which they are fastened together. By the four last-mentioned methods of construction a smooth outer surface is obtained, but aside from this they do not compare favorably with the lapstroke for small work. A "lapstrake" cedar canoe now cruising in Florida weighs 10 pounds and a few ounces, and is capable of carrying a man and 30 or 40 pounds of "dunnage" quite comfortably. It would be hardly possible to attain the same degree of lightness and strength combined by any other method of building. The lapstrake method, however, is not applicable to large boats and vessels, from the fact that its water-tight qualities depend on the closeness of contact between the wood surfaces caused by the driving and clinching of the nails, and the strains which a large boat is subjected to in a heavy sea causes these surfaces to work on each other and loosen the fastenings. When once loosened they cannot be tightened, nor can the seams be calked, because any attempt to drive calking material into the

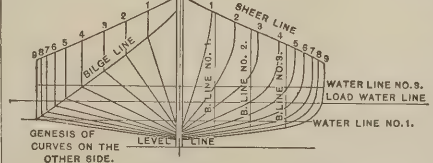



*Fig. 7.—Body Plan.—Scale, 3/8 Inch to the Foot.*

seams only has the effect of pulling them further apart. In carvel boats the seams open and sometimes the calking is worked out, but they can be easily recalked, as the strain produced by calking is at right angles to the fastenings and does not injure them. A small lapstrake boat may be built perfectly tight without the use of paint to fill up the seams, and it will stand a great deal of knocking about before getting "shaky," when a coat of paint will mako it as good as new.

The "clinker" is generally built sharp at both ends, although a great many are built with square sterns. The latter are not so good for rough water; the stern, being cut away below the water line, lacks buoyancy, and in riding a sea sinks a great deel deeper than the bow, and is very liable to take the crest of a wave inboard, especially if it happens to break as the boat goes over it. When both ends are alike the stern lifts a great deal quicker, and the chances of taking in water are considerably lessened. The average size of a clinker is about 4 feet beam, 18 feet in length over all, and 13 inches deep at the center. Some are built larger and some smaller, but there are more built of those dimensions than of any other, a boat of this size being easily handled with either one or two pairs of oars, will carry four persons safely, and can be drawn out of the water readily by one man.

After deciding on the size and style of boat, the next step is to make the drawings. These consist of the body plan, the sheer

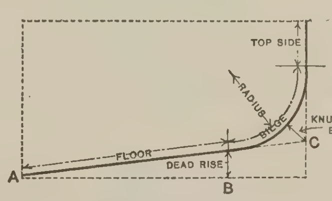
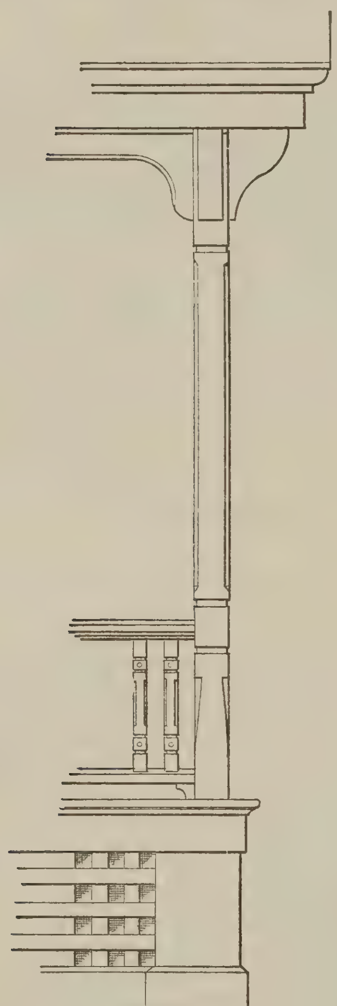



*Fig. 9.—Midship Section.—Scale, 3/4 Inch to the Foot.*

plan and the half-breadth plan, with as many details as the size and importance of the boat may demand; the drawings are called "plans," but the body plan is really an end elevation, while the sheer plan is a side elevation. The first part to be considered is the midship section, corresponding to line No. 9 on Figs. 6, 7 and 8, as the shape of this has a great influence on the entire shape of the boat. This section is always taken at the widest part of the boat, and is not always placed at an equal distance from each end, some designers contending that it gives better results when placed nearer the bow, on the "cod's head and mackerel tail" principle, but in this instance it is placed exactly in the center, as we believe it is the proper place for it. The midship section may be divided into three component parts—the floor, the bilge and the freeboard or topside. When the floor rises from a level line, as in Fig. 9, it is called a "rising floor," and the distance between it and the level line A B is called the "deadrise," generally expressed in a certain number of inches to a foot; in this instance it is 1½ inches to a foot. When the floor is level and coincident with the line A B it is called a "flat floor," and has no deadrise. A boat with a flat floor will not draw so much water and is not so "cranky" to move about in as one with a rising floor, but a rising floor behaves better in rough water and is productive of finer lines fore and aft. Care must be taken, however, not to give too much deadrise to the floor, or the boat will require ballast to make it steady enough for comfortable use. The depth of the topside is generally equivalent to the width of the top strake, as this strake should always

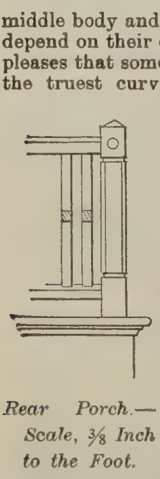
be vertical, but some builders extend the curve of the bilge to the gunwale, doing away with the topside entirely. This is bad practice, however, as it diminishes the bearings or "knuckle" of the bilge and impairs the sailing qualities of the boat. The bilge may be any curve that the fancy of the designer may dictate, but we consider the part of a circle forming a tangent with the topside and floor to be the best and easiest applied.

The next drawing to be made is the half-breadth or deck plan. Here again the fancy of the designer may dictate a variety of curves, making the bow full and stern slender, or, by carrying the midship section well forward and aft, making a parallel



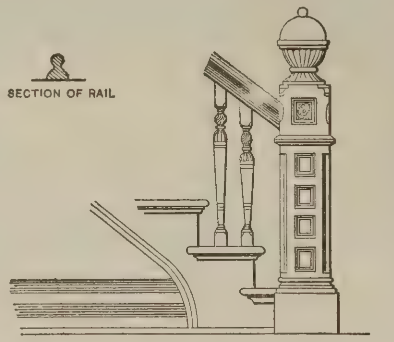
*Details of House by "Ko Ko" (See Plates IX and X).—Front Piazza.—Scale, 3/8 Inch to the Foot.*

middle body and bluff ends. Many builders depend on their eye and trace a curve that pleases that sometimes deceptive organ; but the truest curve, and one that gives the finest lines, is an arc of a circle struck with a radius touching both ends and the midship section. Before striking this line deduct the width of the stem and stern from each end and lay off half the thickness of stem and stern at one side of center line as a starting point. In drawing the sheer plan we commence with the keel. This may be from 1 to 1½ inches deep, and we have rockered it 1 inch. The reasons for raising the keel at each end are, first, to counteract the tendency that every boat has to become "hogged" or dropped at the ends, caused by the center receiving more support from the water than the ends; second, the boat turns easier, and, last, it will run up further on a beach when making a landing.



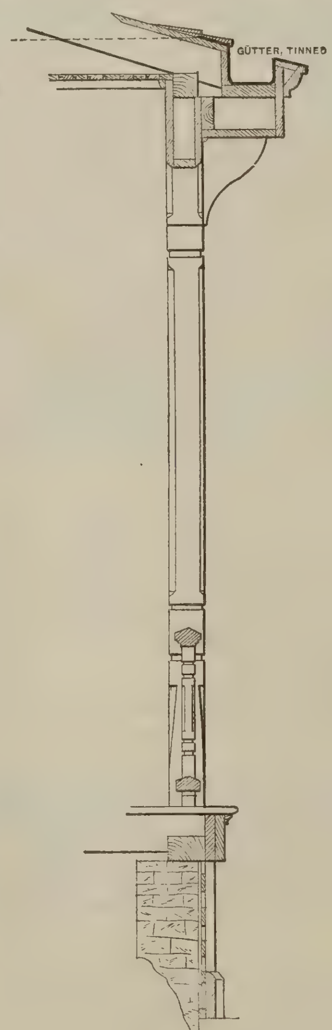
*Rear Porch.—Scale, 3/8 Inch to the Foot.*

The sheer is the distance that the ends rise above the center at the deck line. It is generally an inch or two more at the bow than at the stern, and, like the deck line, the




*Main Staircase.—Scale, 3/8 Inch to the Foot.*

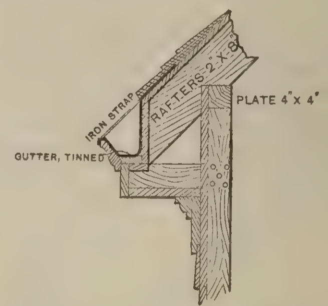
sheer line should be an arc of a circle. Plenty of sheer makes a boat suitable for heavy seas and rough water, and it also makes a boat difficult to row against a head wind. We have selected 11 inches as being a moderate sheer, and made it the same at each end; the stems should be plumb for half their depth, the curve joining them to the keel being a quarter circle; the line of the planking should also join the upper line of keel with a quarter-circle struck with a




*Section Through Front Piazza.—Scale, 3/8 Inch to the Foot.*

longer radius than the face of stem, so as to leave as much wood as possible to be tapered to a fine edge. After the keel, stem and stern have been drawn, and the sheer line struck, the bilge line may be struck This is also an arc of a circle, starting at the bottom of the top strake at stem and stern, and touching the point C, Fig. 9, where the lines of the floor and topside would meet if extended.

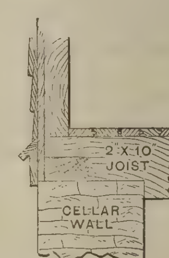
We now divide the sheer plan vertically by lines 12 inches apart, according to scale, as shown in Fig. 6, and number them consecutively from stem to stern, as shown; we also divide the half-breadth plan in the same manner, and number the lines to correspond with those on the sheer plan; this done, we can commence to fill out our body plan. Draw a vertical line on each side of the center line of body plan, to represent the thickness of the stem. Now measure up from the level line in Fig. 6 to where line No. 1 intersects or stops at the rabbet line, and lay off the same distance on the stem in Fig. 7, measuring up from the level line. Now measure the distance from the level line to where line No. 1 intersects the bridge line in Fig. 6, and transfer this distance to the stem in Fig. 7, measuring up from the level line as before. Through the point thus found draw a light horizontal line; now take a third




*Main Cornice and Gutter.—Scale, 3/8 Inch to the Foot.*

measurement from the level line in Fig. 6 to where line No. 1 starts from the sheer line, and transfer this point to the stem in the same manner as the two preceding measurements, also drawing a light horizontal line through this point. The first horizontal line represents the hight of the bilge line where it intersects with line or station No. 1, and the upper horizontal line the hight of the sheer line at the same place. We now go to the half-breadth plan, and on station No. 1 we measure the distance from the line representing the thickness of the stem to the deck line, and lay this distance off on the upper horizontal line on the body plan, measuring from the side of the stem. Now draw a straight vertical line from this point to the lower horizontal line bilge point, and connect the bilge point with the rabbet point on the stem by another straight line. We have now the shape of station 1 on the body plan, as shown on the left side of Fig. 7.

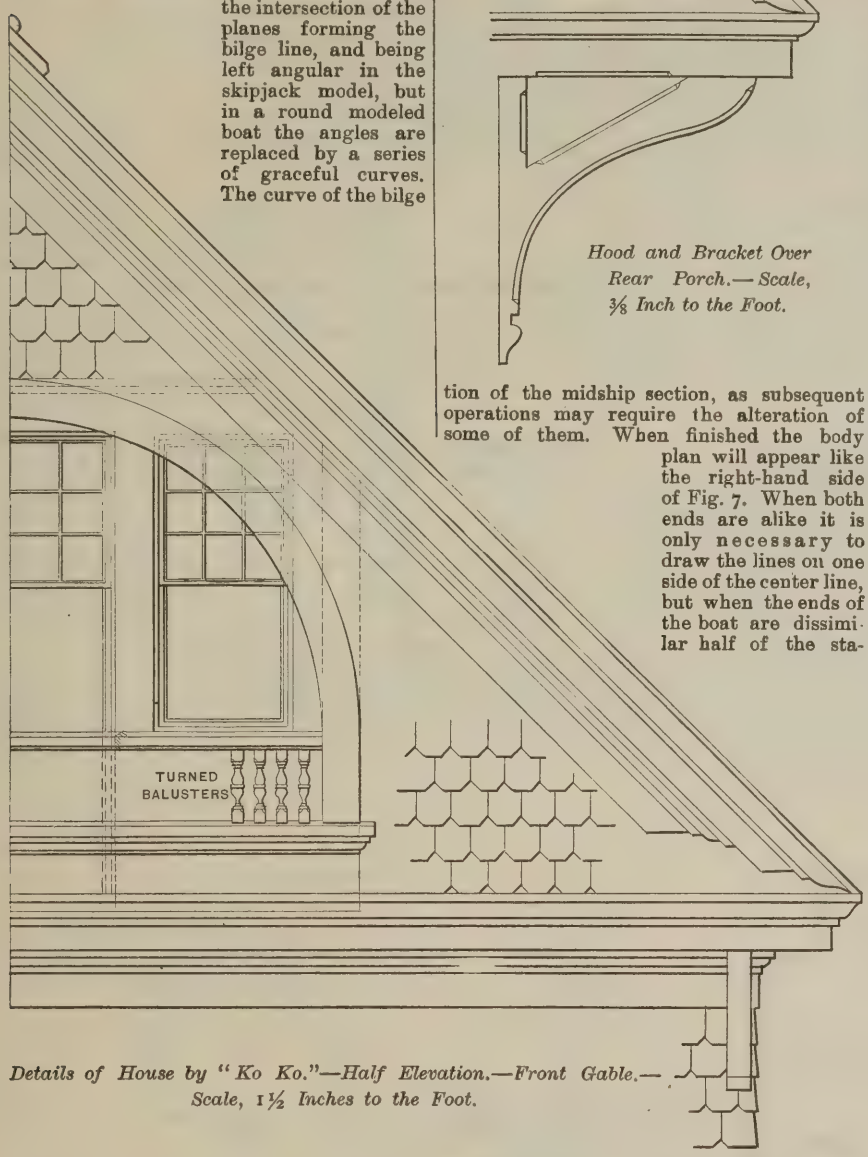
*Belt Course.—3/8 Inch Scale.*




*Water Table.—3/8 Inch Scale.*

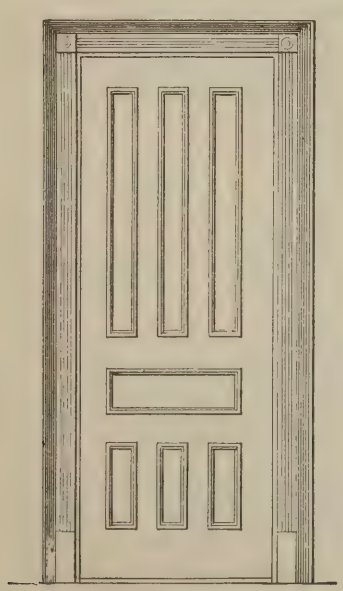
We now go through the same process at each station up to and including No. 9, which is the midship section, and drawing a line through the upper points to represent the deck and sheer lines, and one through the lower points to represent the bilge line, we have the body plan completed as far as shown on the left side of Fig. 7. We now have a flat bottom or plane curving gradually from an almost horizontal position amidships to a vertical position at each end, and a vertical side intersecting it, the line of intersection being marked by the bilge line. Quite a number of boats are built in this manner, with perfectly straight timbers on bottom and sides, principally on Long Island Sound and vicinity. They are known as "skipjacks," being an evolution of the sharpie, and possessing somewhat better seagoing qualities than that craft. Our

next step will be to replace the sharp angles shown on the left side of the body plan with the curves shown on the right; this might have been done as we proceeded with each line, but we wished to show that the body of a boat was formed by two curved planes, the intersection of the planes forming the bilge line, and being left angular in the skipjack model, but in a round modeled boat the angles are replaced by a series of graceful curves. The curve of the bilge




*Details of House by "Ko Ko."—Half Elevation.—Front Gable.—Scale, 1½ Inches to the Foot.*

at station 9, or the midship section, is shown in Fig. 9, and the curve at each station is obtained in the same manner, the radius in-



*Elevation of Door.—Scale, ⅜ Inch to Foot.*

creasing at each station toward bow and stern, and the point from which the arc is struck being nearer the sheer line at each station approaching the ends. It is not necessary to be exceedingly particular in drawing these curves in at first, with the exceptions



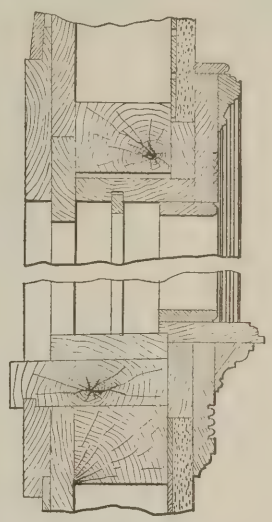
*Hood and Bracket Over Rear Porch.—Scale, ⅜ Inch to the Foot.*

tion of the midship section, as subsequent operations may require the alteration of some of them. When finished the body plan will appear like the right-hand side of Fig. 7. When both ends are alike it is only necessary to draw the lines on one side of the center line, but when the ends of the boat are dissimilar half of the stations are drawn on one side and the remaining half on the other.

Our next step will be to draw the water lines on the body and sheer plans. The first is drawn 3 inches up from the bottom of the midship section, where it joins the rabbet line, and the other two at intervals of 3 inches each. After drawing them in on the sheer and body plans we proceed to transfer them to the half-breadth plan in the following manner: Commencing with water line No. 1 on the sheer plan, we measure from the extreme end of the stem to where the water line intersects the rabbet line, and transfer this distance to the half-breadth plan, marking the point on the stem line; this will be the starting point of the water line at each end. Now we go to the body plan, on the right side, and on the same water line measure from the side of the stem to where the water line intersects with line No. 1, and transfer this distance to the half-breadth plan, measuring from the stem line at station No. 1 out toward the deck line; we also lay off the same measurement at station No. 17. On the same water line on the body plan we take the measurement from stem line to line No. 2 and transfer it to stations 2 and 16 on the half-breadth plan, and so with every station till we come to the midship section. Through the points thus laid down on the half-breadth plan we trace the first water line, as shown in Fig. 8.

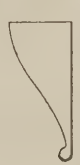
*Base Board.—1½ Inch Scale.*

If the curve increases and diminishes gradually, without any sudden kinks or crooks, we may infer that our curves in the body plan are satisfactory and proceed in the same manner to lay down water lines Nos. 2 and 3. When the water lines are traced any defects in them may be remedied by altering the curves in the body plan, and making the resultant alterations in the water lines, always recollecting, however, that the floors of all the lines, and the topside and bilge curve of the midship section, are fixed

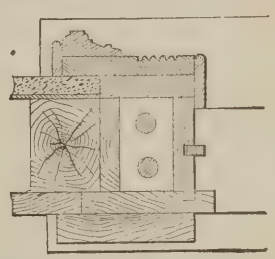


*Vertical Section Through Window Frame.—Scale, ⅜ Inch to the Foot.*

quantities and must not be tampered with after their shape has once been decided upon. The concave portion of the load water line forward is called the "entrance," the concave part aft the "run," while the convex portion between is generally called the "middle body." We now come to the last series of lines with which we have to deal, called "buttock" lines. These are longitudinal lines dividing the half-breadth plan into four equal parts and appearing on the body plan as vertical lines dividing it in the same manner. They bear the same relation to the sheer plan that the water lines do to the half breadth plan and might be called "vertical" water lines.



We commence with buttock line No. 1, and on the half-breadth plan measure the distance from station No. 1 to where the buttock line intersects the deck line, and transfer this measurement to the sheer line in the sheer plan. It will be noticed that the deck line and sheer line are the same, but are looked at from different directions. We now go



*Horizontal Section Through Window Frame.—Scale, ⅜ Inch to the Foot.*

to the body plan, and measure downward along buttock line No. 1 from the deck line to where the buttock line intersects line No, 2, and transfer this measurement to lines Nos. 2 and 16 on the sheer plan. We repeat these measurements with each line on the body plan down to the midship section. We now have a series of points on the sheer plan through which we must trace a curve, as shown in Fig. 6. This curve, like the water lines, must be easy and gradual from end to end. If it shows any abrupt changes or kinks they must be straightened out by further changes in the curves of the body

plan and the water lines. Buttock lines Nos. 2 and 3 are drawn in exactly the same manner as No. 1, and when these are put in the drawings or lines are completed. It will be seen that each set of lines depends on the others for its form, and one set cannot be wrong without deranging the others. The intersections of the lines in each plan make it an easy matter to verify them and insure absolute correctness. After being drawn on a small scale they should be drawn full size on paper or on the floor of a loft, where they need not be disturbed till the boat is completed, as it will be necessary to refer to them from time to time as the work progresses. We might go further with the drawings, and mark out the planks or strakes, but this is not necessary, as the shape of each plank can be found as it is required for use.

(To be continued.)

Michigan still leads the lumbering industry. In 1880 the census showed 1649 establishments, giving employment to 30,886 persons, with a total invested capital of $39,260,428, and producing $52,449.928. The annual review for 1885 shows 2,952,762,159 feet of lumber cut during the year, and there was on hand at the close of the year 1,097,526,397. During the same time the cut of shingles was 2,390,156,500.

## House Design by "Ko Ko."

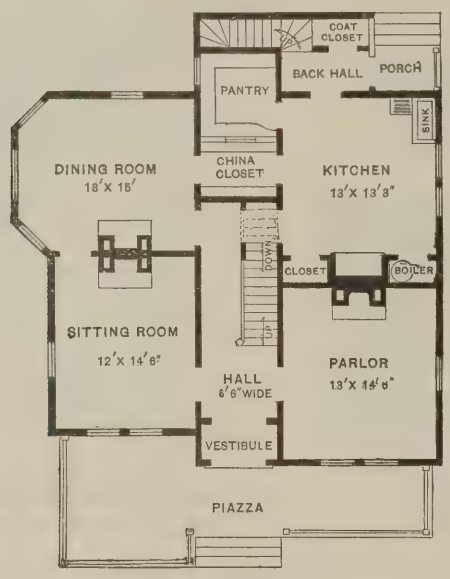
Among the designs received in response to the advertisement of our Seventeenth Competition, an extension in time of which is announced in another column, was a study submitted over the *nom de plume* of "Ko Ko." We have obtained permission of the author of the plans for their publication in this issue, the same remaining in the competition and subject to the decision of the committee of award in the matter of prizes. This contestant has submitted a very attractive study, but extended comment from us would be inappropriate under the circumstances. The following is the estimate submitted with the study:

*Mason's Estimate.*

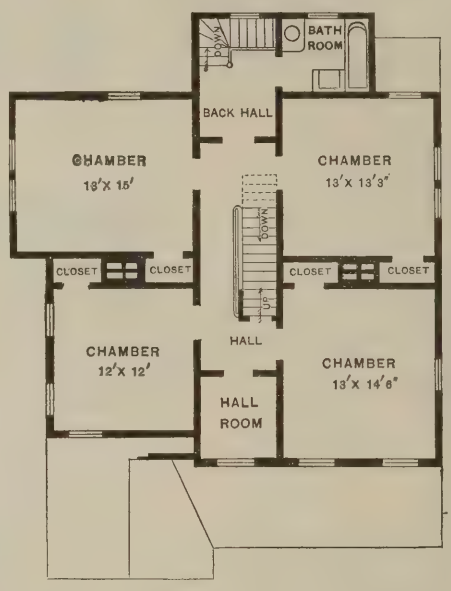
| | |
|---|---|
| 222 yards excavating, at 22 cents per yard. | $48.84 |
| 78 perches stonework, at $3.50 per perch, laid | 273.00 |
| 7 cellar window sills, at $1 per sill | 7.00 |
| Cellar steps | 15.00 |
| 30,000 brick, at $16 per M., laid | 480.00 |
| 4 fireplaces, at $25 | 100.00 |
| Drains | 25.00 |
| 110 yards concrete, at 30 cents per yard | 33.00 |
| 1200 yards plastering, at 30 cents yer yard. | 360.00 |
| Total | $1,341.84 |

*Carpenter's Estimate.*

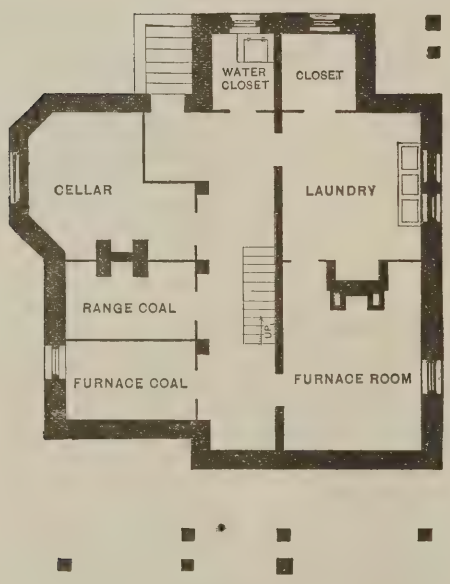
| | |
|---|---|
| 15,000 feet timber, of spruce, at $16 per M. | 240.00 |
| 2200 feet spruce sheathing, at $15 per M. | 33.00 |
| 700 feet clapboards, at $30 per M. | 21.00 |
| 12,000 shingles for side walls, at $6 per M. | 72.00 |
| 20,000 shingles for roof, at $4.50 per M. | 90.00 |
| 1200 feet roof strips, at $15 per M. | 18.00 |
| 350 feet cornice and gutter, at 20 cents per foot | 70.00 |
| 90 feet corner boards, at 10 cents per foot | 9.00 |
| 74 feet water table, at 10 cents per foot | 7.40 |
| 31 feet piazza, at $10 per foot | 310.00 |
| 1 dormer window | 25.00 |
| 3500 feet of flooring, of pine, at $25 per M. | 87.50 |
| 30 doors, casings, hardware, &c., complete, at $10 per door | 300.00 |
| 41 window casings, hardware, &c., complete, at $8 per window | 328.00 |
| Fitting up pantry | 25.00 |
| Fitting up china closet | 15.00 |
| Fitting up bathroom | 25.00 |
| 1 set washtrays | 10.00 |
| Stairs, complete | 100.00 |
| Cellar partitions, &c. | 10.00 |
| Nails | 50.00 |
| Labor | 800.00 |
| Painting | 200.00 |
| Plumbing and tinning | 300.00 |
| Total | $3,145.90 |
| Mason-work | 1,341.84 |
| Net cost, to which profit is to be added | $4,487.74 |



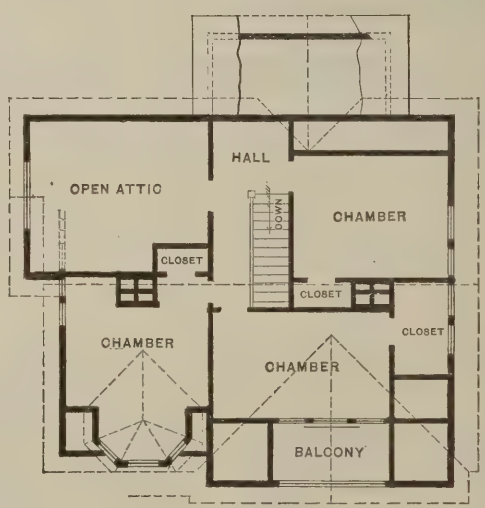

First Floor.




Second Floor.




Foundation.

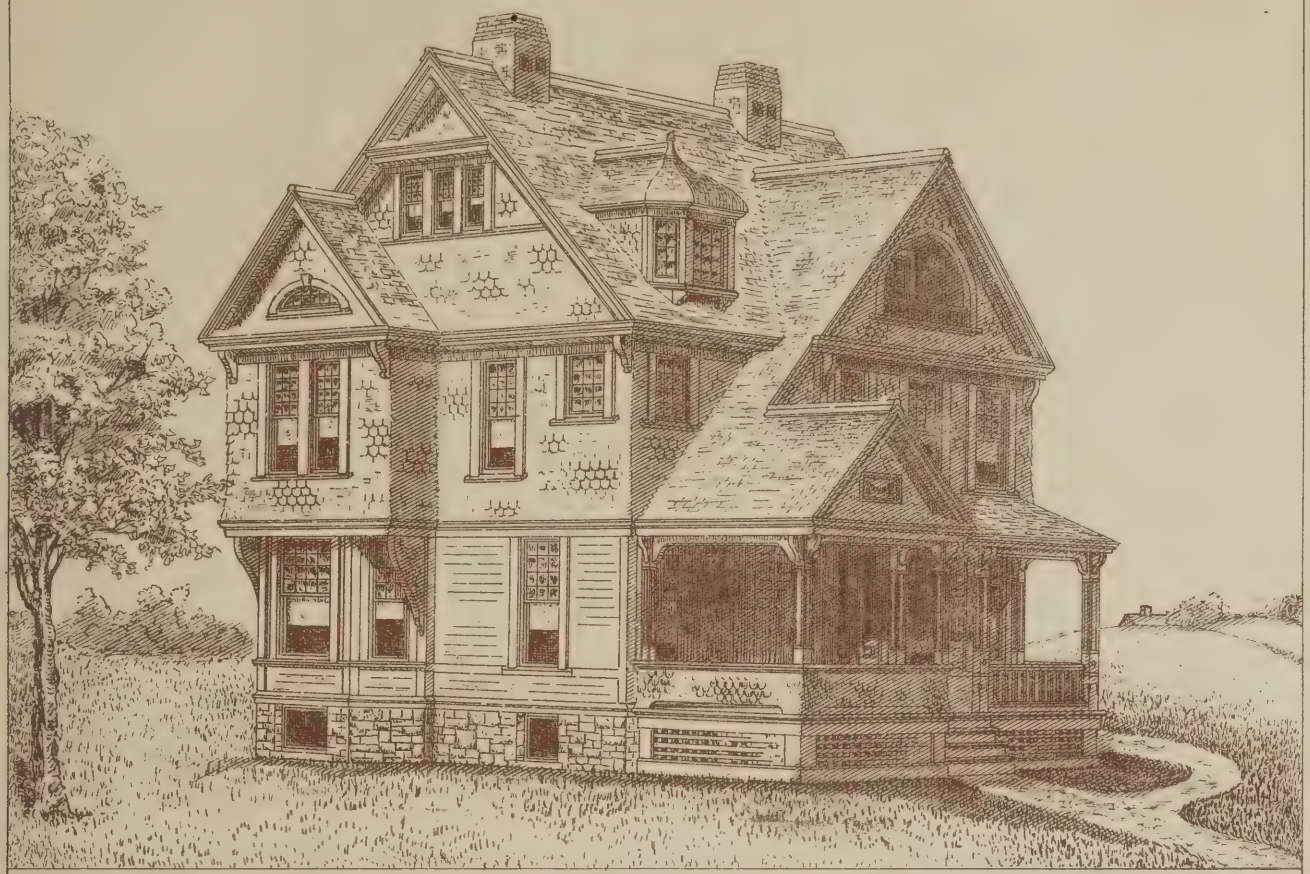



Attic and Roof Plan.

*Foundation and Floor Plans of "Ko Ko's" Study, Submitted in the Seventeenth Competition—Scale, $\frac{1}{16}$ Inch to the Foot. For Perspective and Elevations See Plates IX and X.*

The owner of one of a row of new houses saw a little girl taking observations on the street the other day and entered into conversation with her. "Oh, yes," she said, "I like these houses, but my papa don't." "Well, what fault has he to find with them?" "He says he cannot drive through this street because they frighten his horse."

PLATE IX.



Perspective View.

HOUSE
DESIGNED
BY "KO KO."

Side Elevation (Left).—Scale, ⅛ Inch to the Foot.

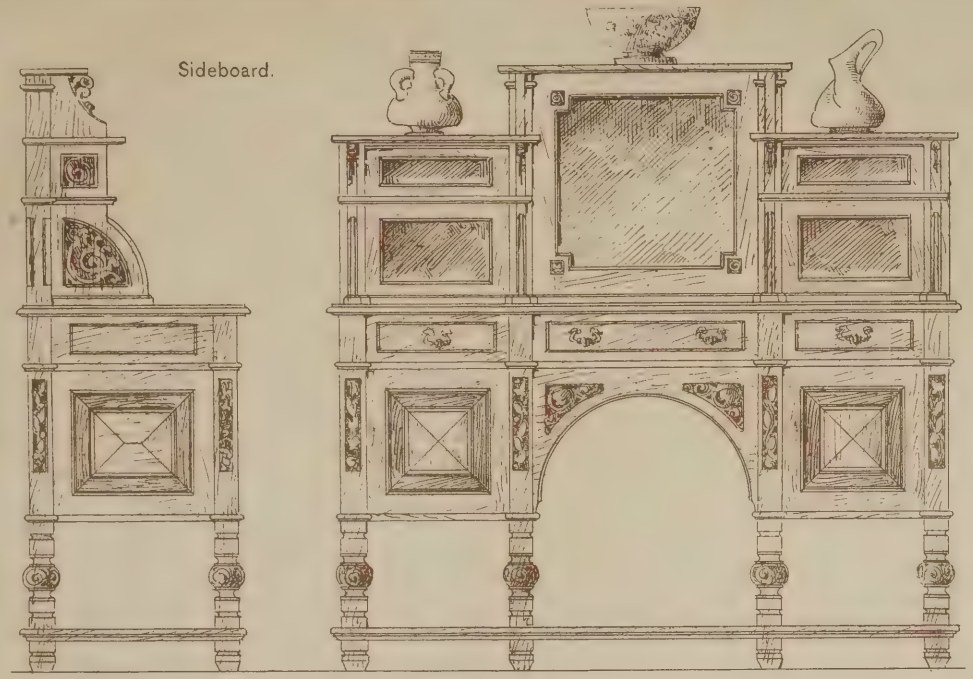
PLATE X.

Front Elevation.—Scale, ⅛ Inch to the Foot.

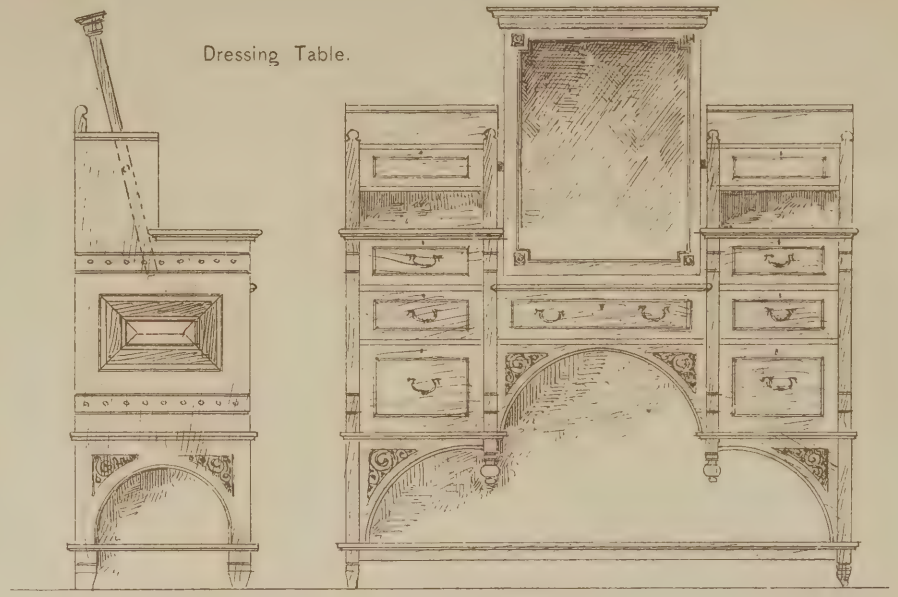
# HOUSE DESIGNED BY "KO KO."

Side Elevation (Right).—Scale, ⅛ Inch to the Foot.

Sideboard.



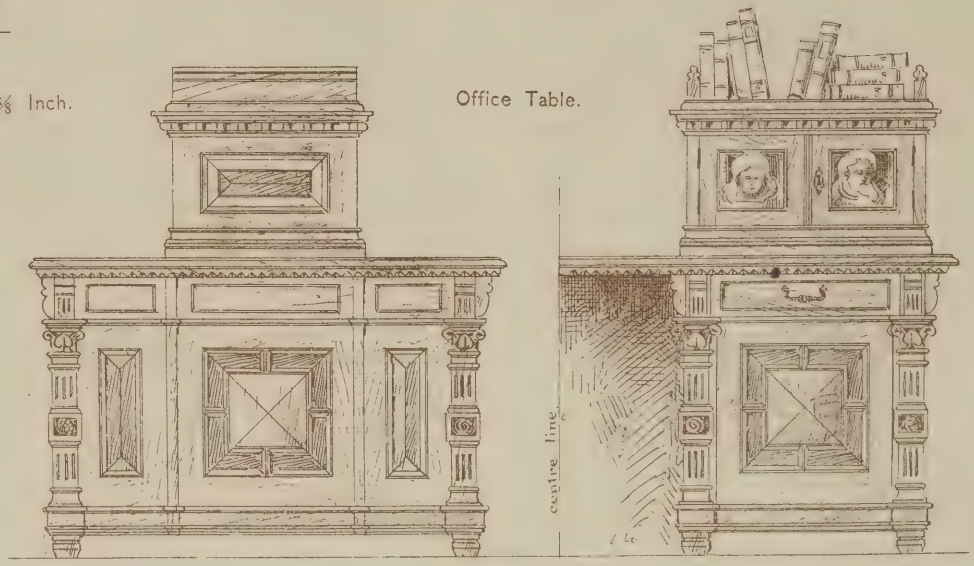
Dressing Table.



Washstand.

Scale, ⅜ Inch.

Office Table.




STUDIES IN FURNITURE DESIGN. BY J. W. H. WATTS.

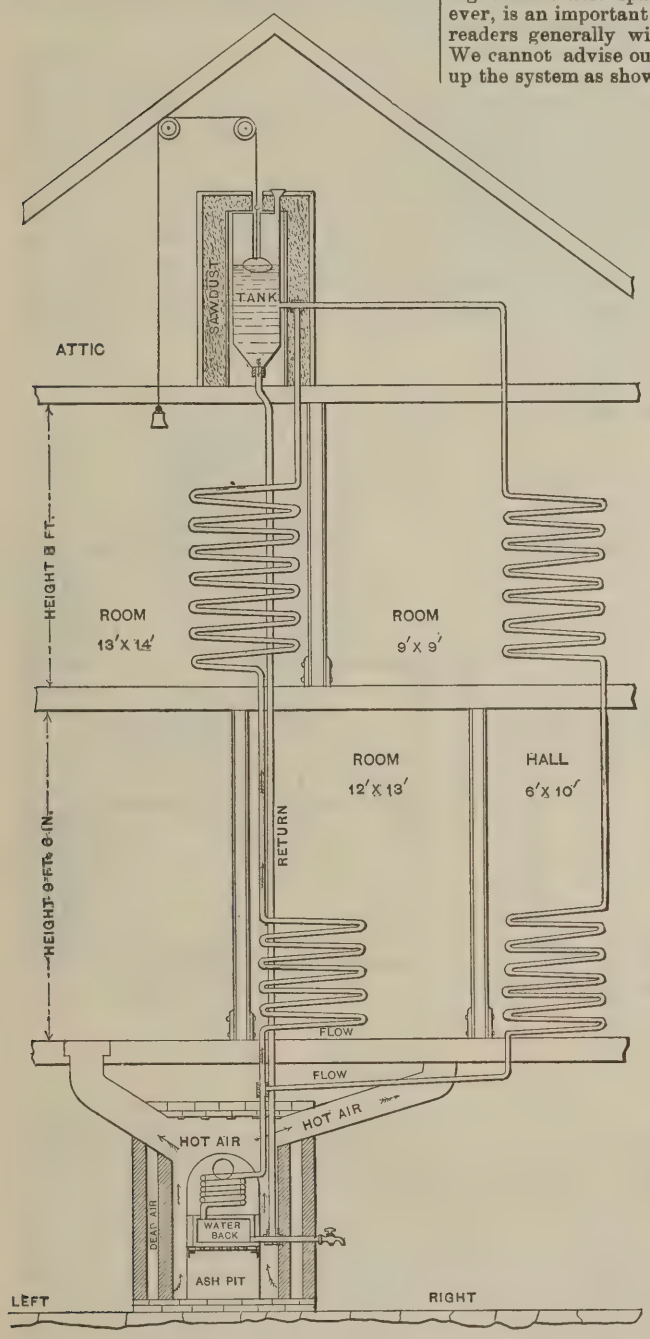
Scale, $\frac{1}{32}$ Inch to the Foot.

DESIGN FOR SUBURBAN RESIDENCE, BY U. S. WICKS AND F. R. FULLER.

# CORRESPONDENCE.

### Hot-Water Heating.

*From* H. W. C., *Redwing, Minn.*—I intend to use hot-water circulation in combination with hot air for heating my house. This plan is something about which I know very little, so far as the practice is concerned, and accordingly I would like to ask for information through *Carpentry and Building.* I notice, in the March issue for 1880, you give




*Heating with Hot Water.—Fig. 1.—Diagram Accompanying Letter from H. W. C.*

air-cocks on each coil where they are heated from the water-back. I see that Mr. Hughes has them in the system shown by him in the number referred to. The sizes of the rooms to be heated are marked on the inclosed drawing. The two coils on the right are in the coldest part of the house. In addition to the above information, please state who keeps hot water coils for sale, or is it cheaper to make them with straight pipe and return bends?

*Answer.*—Our correspondent's questions are somewhat comprehensive, and we cannot give the desired information without occupying considerable space. The subject, however, is an important one, and no doubt our readers generally will be interested in it. We cannot advise our correspondent to put up the system as shown on his plan, which is presented in Fig. 1 of the accompanying illustrations. So constructed the system will probably work, but he will encounter more trouble with it than is necessary. The one way of heating with a boiler, but that is not exactly what I want. In the case shown the return-pipes run from each coil to the boiler. Such an arrangement would not answer in my case, as I intend to use for heating the water a water-back and a coil of pipe in the back of the fireplace in my furnace. I desire to use four heating coils of 1-inch pipe in the rooms above. Do you think I would get heat enough to warm the rooms by this arrangement? The size of water space in the water-back is 4 x 10 x 12 inches. Would you advise me to let the return down through two coils and flow up through the other two, or is it correct as I have drawn it on the inclosed sketch? In other words, do you think the return would heat the two coils on the left? Is it necessary to have

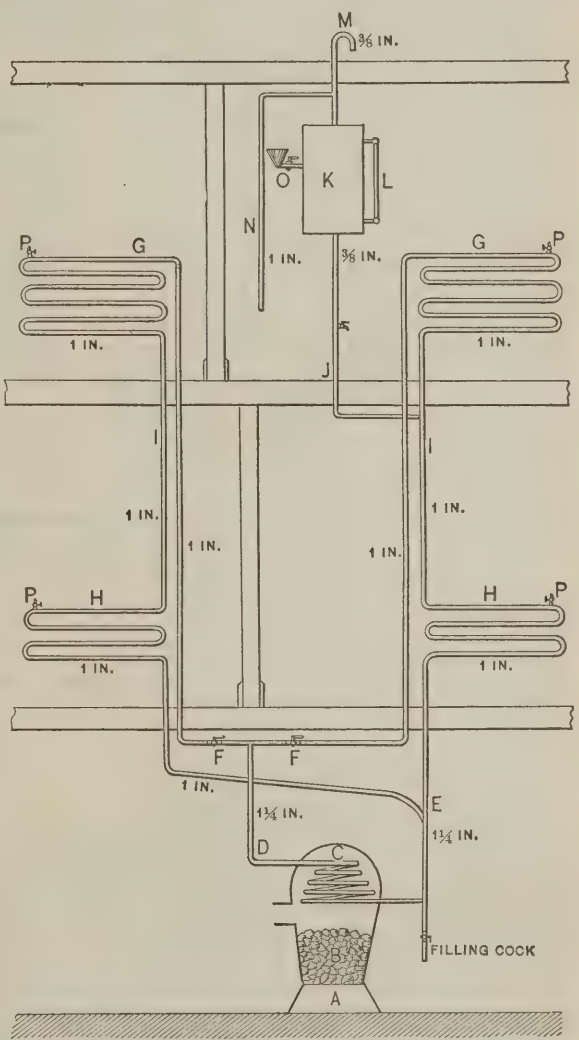



*Fig. 2.—Suggested Arrangement of Coils, &c.*

method of heating of which he writes is one that is common in certain portions of Canada, and was introduced into Montreal, if we mistake not, about 20 years since. The system was the outgrowth of the hot-water heating system which has long been popular in Canada. It was found to be somewhat more expensive than the hot-air system. It was natural, therefore, to suppose that by combining the two plans there would result a form of apparatus that would give excellent satisfaction and enable apartments to be heated by a single fire that could not be kept satisfactorily warmed if air only were used. Growing out of this idea many forms of heaters have been devised and tested in connection with different forms of furnaces. Some have had cast-iron backs, others coils made with return bends. The upper portion of some furnaces have been made of wrought iron, but hollow—being, in fact, miniature boilers, forming a part of the hot-air furnace. These have given excellent results, but they are expensive, and when the cost of heating by the combination system was found to be nearly, if not quite, as expensive as the cost of heating by hot water alone, the hot-water system was preferred. Self-feeding furnaces have been made with the lower part of the feed-chamber cast hollow to serve as the water heater, and other devices have been tried, but the main reliance in Canada at the present, and one giving the best results for the cost, and being the easiest applied, is a spiral coil of pipe placed in the dome of the furnace over the fire. The secret of success, we may explain, is to so arrange the pipes as to allow the freest circulation of the water. Pipes should be so placed that the circulation will not be checked, and so that the heated water can get away from the heating coil in the quickest and freest manner, and in turn be replaced by the colder water coming back by the return-pipe. In Canada we believe it is customary to use 1½-inch iron pipe. Some figures which follow, taken from jobs in actual existence, gives an idea of the proportions which have been followed in work of this kind. There is no exactness to the system, from the fact that the degree of temperature of rooms to be heated, the draft, the quality of fuel, the attention to fires and other local incidents make a difference in results. Accordingly there is ample room for the exercise of individual judgment.

One of the greatest difficulties, we learn from Mr. Hughes, that hot-water heaters have had to contend with is adjusting the quantity of pipe to the fire. That is, a coil of pipe that would effectively heat a number of coils in mild weather, with a moderate fire, might prove too large if the fire was

driven, and accordingly give a boiling noise in the pipes. By having plenty of coils and large flow and return pipes, so arranged as not to impede circulation, such trouble is not likely to occur. The idea is to furnish in connection with a hot-air furnace means of warming, in part at least, rooms so situated that the hot air will not be directly available. By putting a direct-heating appliance in a room, even if not sufficient to do all the heating of the room, the air is warmed and put in circulation, and then the hot air from the halls is given a chance to enter and further warm the room. It is frequently found in Canadian practice that the addition of 100 or 200 feet of hot-water pipe will, in connection with a hot-air furnace, make all the difference between a partial failure and the successful heating of a house. Some of the largest public schools and similar buildings in Montreal are heated by the combination plan.

The following figures have been kindly furnished us by Mr. J. H. Hughes, of Montreal, to whose article on hot-water heating, published some years since, our correspondent refers. They show the amount of heating surface in a number of jobs as compared with the coils and mains.

30 feet of 1¼-inch pipe, heating 1300 feet of coils and mains of 1-inch pipe.

11 feet of 1¼-inch pipe, heating 380 feet of coils and mains; mains, 1-inch pipe; coils, ¾-inch pipe.

11 feet of 1¼-inch pipe, heating 260 feet of coils and mains of 1-inch pipe.

9 feet of 1½-inch pipe, heating 240 feet of coils and mains of 1-inch pipe.

13.7 feet of 1½-inch pipe, heating 550 feet of coils and mains; mains, 1-inch; coils, ¾-inch.

12.7 feet of 1-inch pipe, heating 352 feet of coils and mains; mains, 1-inch; coils, ¾-inch.

12 feet of 1-inch pipe, heating 321 feet of coils and mains; mains, 1-inch; coils, ¾-inch.

11.1 feet of 1-inch pipe, heating 439 feet of coils and mains; mains, 1-inch; coils, ¾-inch.

14 6 feet of 1-inch pipe, heating 400 feet of coils and mains; mains, 1-inch; coils, ¾-inch.

13.2 feet of 1¼-inch pipe, heating 490 feet of coils and mains; mains, 1-inch; coils, ¾-inch.

As already mentioned, the above figures are from jobs in Montreal and vicinity that are working well and giving good results. They were recorded several years since. We learn from Mr. Hughes that the present practice is to use 1¼ or 1½ inch heating coils and mains with 1-inch coils in rooms in place of ¾-inch coils. The coils in rooms are frequently fed by ½-inch or ¾-inch connections. Where it is possible to divide the house into sections it is an excellent plan to fit valves to control the sections. Occasionally valves are put on the coils, not for the purpose of shutting them off, but for the purpose of regulating the flow. It sometimes occurs that the water, especially if a small fire is used, will take the nearest and most direct course, to the neglect of those portions of the system situated at a greater distance. By having valves, such working of the system can be regulated by partly closing them. It is the custom, we learn, to remove the wheels of the valves, so that when they are once set they will so remain without danger of change from meddling.

If our correspondent had sent the plan of his house as well as the section we could perhaps have laid before him a suggestion of a system adequate for his purpose more intelligently than we are able to do at present. However, we take it that the coils are in rooms one immediately over the other. This being the case, we would suggest that they be arranged as in the sketch shown in Fig. 2. Referring to the lettering in Fig. 2, A represents the ash-pit, B the fire-pot, C coil in dome of furnace over the fire, D the flow, F F 1¼-inch flow divided into two 1-inch flows going to top coils and entering the top coils G G, as shown. The water drops through them and descends by L I, forming the flow of coils H H. From there it drops as convenient and rejoins the return E, as shown. In this connection it might be remarked that division tees make an excellent fitting for such connections. The expansion-pipe should be taken off on the return between the coils G and H. The expansion tank should be placed where it will not freeze. It should be fitted up with a water-glass, L, and funnel and cock, O, for filling the overflow-pipe in case the water should boil over. M shows a ⅜-inch pipe taken from the top of the T-branch on N. This pipe in many cases is run through the roof. Its use is to prevent a vacuum in the pipe and consequent collapsing in the tank in case the water should boil over. In current practice in some instances this pipe is dispensed with, a vacuum-valve being used instead.

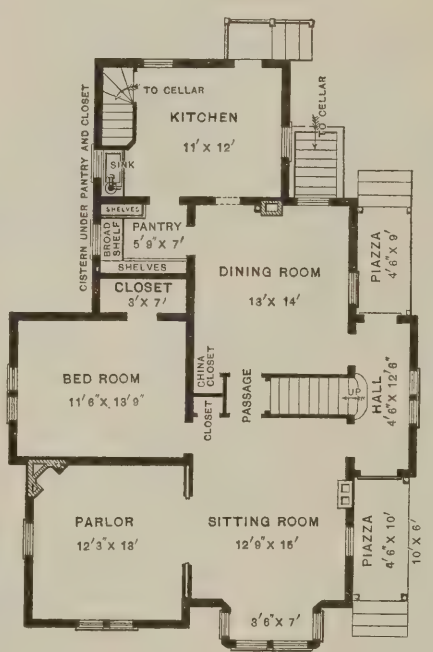
Answering our correspondent's question near the close of his letter, we would say that coils can be made by hand with ordinary return bends. Air-cocks must be placed to allow all of the air in the pipe to escape. More failures and more trouble occur probably from coils becoming air-bound than from any other one cause connected with hot-water heating. For a first-class job our correspondent might use pitch bends. In Mr. Hughes' practice, however, we learn that in all cases he uses close bends and sets the coils level. Where convenient, in place of air-cocks, a ¼-inch pipe might be run into the upper part of the expansion tank or through the roof, thus allowing the air to escape automatically. In starting, the system of pipes should be filled very slowly. Where city pressure is used it is common to fill from the bottom of the return, as shown in our sketch. If the coils get warm and all works well, with the exception that there is not sufficient heat, it would indicate that a larger coil in the furnace is needed. If the water boils too freely and all the coils work well, then larger heating coils in the rooms or more coils placed in other rooms will remedy the trouble. We learn from Mr. Hughes that he usually puts 5 feet of 1-inch pipe per 100 cubic feet of contents of room to be warmed. In cold rooms this will have to be considerably increased, and if the effort is made to heat a house that is carelessly built, with cracks and openings about doors and windows, double the quantity would not be too much.

If our correspondent fails to understand any of the explanations that we have offered above we shall be pleased to have him propose further questions. We have attempted to go into the subject somewhat exhaustively, and in the facts we have presented and the advice given have followed closely the practice of Mr. Hughes and his associates through a term of years. Hot-water heating is deserving of more attention in this country than it receives, and as it becomes better understood it is likely to be more extensively employed.

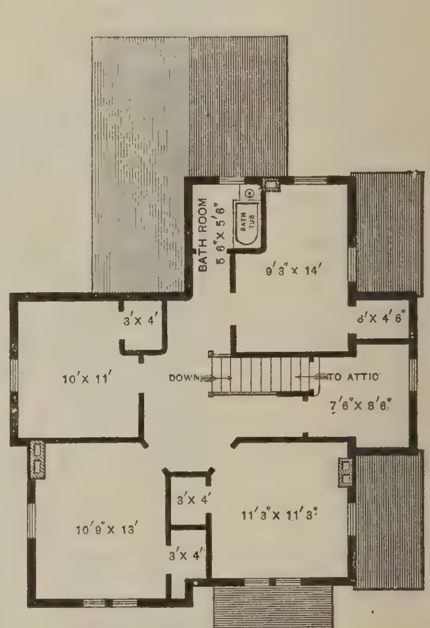
### Floor Plans.

*From* C. L. Graham, *Burlington, Wis.*—I inclose tracings of a set of floor plans which may be of interest to the readers of *Carpentry and Building*. The disposition of the chimneys of the house, the location of the stairs and the general accessibility of each of the rooms are features which the reader will probably notice. A door may be cut directly between the dining-room and kitchen, or the passage may be through the pantry, as shown.

*Note.*—We have engraved the drawings inclosed by our correspondent, and present them herewith. The floor plans shown are as nearly novel perhaps as anything of this kind can be at the present day. In addition to the features above enumerated, the reader will observe that the entrance to the parlor is through the sitting-room. Between parlor and sitting-room sliding doors are employed, and the chimneys are located so as to afford heat at the extreme ends of the combined space. The downstairs bedroom, which communicates with the sitting-room, is also a feature. The dining-room is large and nearly square in shape. It is well lighted, and communication with it from the sitting-room is through a passageway under the stairs or through the hall, as may be preferred. Great care has been bestowed upon the chambers in order to provide each with a convenient closet. Each chamber, with the exception of the small room over the lower hall, may be warmed by a stove. The bathroom is located at the end of the back hall, and is conveniently situated. For a moderate-sized house this set of plans possesses many features of interest. We regret that our correspondent did not accompany them with the elevations, which, we presume he has prepared for them, and which, we have no doubt, would be equally interesting upon examination.



First Floor.



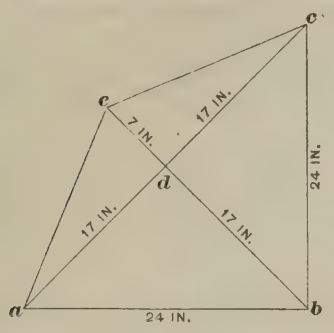
Second Floor,

*Study in House Planning, Submitted by C. L. Graham.*

### Cut for an Octagon.

*From* W. S. W., *Washington, Iowa.*—I notice the question asked in the November number of *Carpentry and Building* why 6 and 12 on the square will not give the cut for an octagon. I will not attempt to say why it will not, but instead will try to show what will give the cut. Referring to the accompanying sketch, there are shown two sides of a square 24 inches. Therefore, by the rule of square root, the line A C must be 34 inches

long. That is, it is so nearly 34 inches long as to make that quantity answer all practical purposes. The half of A C is 17 inches. Since the angle A B C is a right angle, or 90°, dividing it at D by drawing the line B D gives angles of 45°, or eighths of a circle. Now, as all radius lines are the same length, we will set off 24 inches from B to E, and will connect E with C, and E with A, thus giving two sides of an octagon; but, as B D




*Cut for an Octagon.—Diagram Submitted by W. S. W.*

is the same as D C, it must be 17 inches in length; and, since B C is 24 inches, then D E must be 7 inches. As the line E B divides the angle at E, it is the octagon cut. From this it is evident we have 17 inches on the blade and 7 inches on the tongue for obtaining the necessary line. The tongue gives the cut.

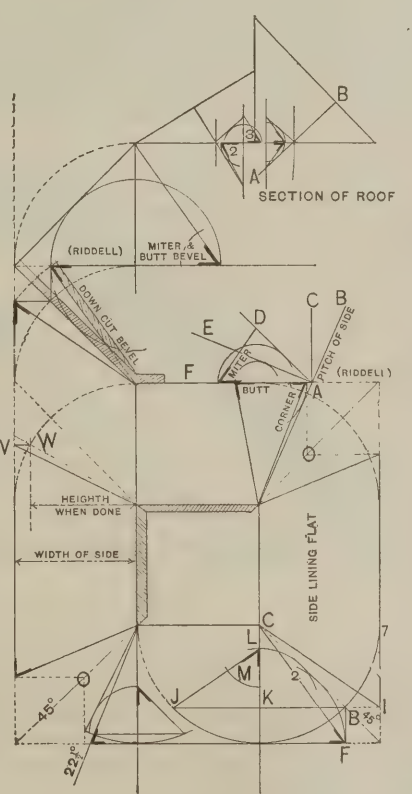
### Miters and Bevels.

*From* L. W. T., *Upper Alton, Ill.*—In the December number of *Carpentry and Building*, on page 231, "H. A. P.," presents a diagram showing some hopper bevels or how to make a hopper. His method pleases me the best of any so far published. On the other hand, his diagram in illustration of the method seem to be incomplete. Accordingly, I have enlarged it and added to it, and present in the diagram herewith inclosed all the lines that seem necessary to show just what it is made of, and further to reveal pretty clearly what is done and why it is done, thus in a measure bringing to a conclusion this long extended and much discussed hopper bevel question. The letters and lines in my diagram are the same as your correspondent above named presented them—that is, that portion of my diagram corresponding to his is lettered similarly. The part referred to is that shown at the bottom and at the right. I should except arc F 2. This illustrates one of Riddell's plans of finding the point F. It shows how much the corner "must be shortened in order to make it long enough"—that is, in order to give it the proper length for the side to stand at a given degree of inclination and coincide with the miter line; that is, 45°. When brought together the hight will be at B, and B J will be on top. K C will show the hight measured through the side. This shortening of the corner to make it long enough puzzled me for many years, simply for the reason that it was not properly explained, or perhaps sufficiently illustrated, to make it clear to my dull brain. An explanation that has been published in *Carpentry and Building* in the past is "the amount gained in running up." I think that it should be the shortening as shown at F B I. The arc J E B 7 is the swing of the top in descending from the vertical to a given inclination. The top of the hopper, when finished, will be found somewhere in this arc. The bevels will gradually become more acute as the sides approach the line 45°, after which, continuing outwardly, they gradually widen out. With the sides pitching 45° the angle of the corner will be greater. The down cut of the corner proves this, for it is much longer. The miter and the butt bevel will be the same, with this difference: if it is desired to put them together, butt, joint, turn the sides around, or, in other words, inside out; apply the stock of the bevel on the inside.

For the sake of comparison I have presented Riddell's lines in a problem of this kind in the upper part of the diagram. I have shown two sections of different pitches corresponding with the pitches below. A B is the pitch of the side. A C is a vertical line, as it should bisect the angle C A F. A D is the bisecting and miter line. A E is a right angle from the side pitch used for obtaining the butt bevel. A F is the top edge of side, being flat, or, in other words, the horizontal line. The dotted squares show where the sides, when brought together, will stand over O, the hight of the hopper being lowered from the width of the side in proportion to the pitch. It will be found on the quarter-circle, which will give the amount of shortening of the corner, as seen by the short solid lines W V, without the aid of the arc F 2 below.

I have also drawn a section of roof with rafters of different pitches as Mr. Riddell uses them in getting bevels for the down cuts and jack-rafter miters. A B is a right angle from the pitch of rafter. Riddell uses the same lines and arcs in getting bevels on hand-rails. This some of your readers know without being told. In this presentation of the subject I may have erred in some particulars or in something said, or in the way of saying it. If so, I shall be glad to have some of the sharp-eyed readers of *Carpentry and Building* point it out, or to further illustrate the subject in such a way that no one will have an excuse for misunderstanding it.

In this connection I would like to ask one or two questions. When a side flares 45°,




*Miters and Bevels.—Diagram with Letter from L. W. T.*

what is the pitch of the corner angle? This looks like a hip and common rafter problem, but I am not sure that it can be solved in that way. I suppose the line I C to be one required, but this is merely guessing at it. By measurement I find the two mitering bevels of the same angle, but I cannot tell why the dotted arc L 2 in connection with the hight of finished hopper (line J K B) gives it. In this I refer to the lines as presented by "H A P."

### Lime Kiln.

*From* C. G. P., *Clifton, Kan.*—In reply to the inquiry of "A. L.," Richmond, Va., published in the December number of *Carpentry and Building*, I advise him to write to J. Sintz, Springfield, Ohio, who has the best kiln with which I am acquainted.

### Metal Roofing.

*From* R. JAHN.—The communication which appeared in the February number of *Carpentry and Building* from Mr. J. H Ferns, of Montreal, concerning roofing in Canada, causes me to express my opinion, based upon an extensive experience. I am actuated to this by the fact of having the true interest of our trade too much at heart to passively see erroneous propositions published, which might incite others to try experiments likely to be injurious to the reputation of our trade, and from which they themselves would gather wisdom only after pecuniary losses. It is at first an error to to formulate into one positive scale of quality the different metals used hitherto as roofing material as such, together with their characteristics of surface condition; because, even leaving out of view the various essential climatic conditions, an entire series of technical peculiarities must be considered, which may exert an unfavorable influence upon the best, and a favorable influence upon the worst, material.

The chief factor in the greater number of buildings is the point of cost. Next, What is the destination of the edifice to be roofed? and how is the condition of its roof framing? Besides this, the local situation of many edifices must be taken into account, especially their exposure to storms. It would, for instance, be a piece of folly to roof a monumental edifice, which by its entire construction is intended to be an object of admiration for futurity, and which very often contains irreplaceable objects of art, with galvanized or tinned sheet iron, and it would be just as ridiculous to cover a simple dwelling, the existence of which depends upon the vicissitudes of business, with copper or lead. After having considered the above-named conditions, we may proceed to the choice of the material and determine its surface condition. For our consideration we have the following metals, both natural and coated: Copper, lead, zinc, tinned, leaded, zinced, tarred and painted sheet iron.

Copper is perhaps most exclusively used whenever the point of cost need not be considered. Its natural toughness permits it to be used for roofing in large sheets as they come from the rolling mill, and resists best the influence of climatic variations; besides this, being the softest of the above-named metals, excepting lead, its seams can be closed very tightly, and on account of this property it can be used for the flattest as well as the steepest roofs of the most complicated forms. The style of roofing most appropriate to copper and best suited to its several characteristics is that having "standing double seams," with double-locked flat cross seams, however, as shown in Fig. 1. Since copper roofs are only exceptionally made serviceable to architecture—in other words, are used less for the sake of appearance, but simply by reason of their service, and this being fully attained by said system—and are intended for a long duration of time without requiring repairs, all other constructions are more or less useless. The creation of the patina—that is, of a nice, uniform oxidation upon its surface—is a great value both as a protective covering to the copper itself and as an effect pleasing to the eye. For this purpose the roof, after being finished, must be thoroughly cleansed with ammonia water, after which the moisture of the air will effect the oxidation.

Lead is also a good roofing material, but on account of its weight its usefulness is restricted withing narrow limits. It is principally used for monumental edifices; still it is well adapted for roofing chemical laboratories, establishments and storehouses, as it resists the action of a large number of acids. Pure distilled water, deprived of all its salts, attacks it strongly. It can be used successfully only for flat roofs with at most 20 per cent. pitch, and the timbering of the roof must be strong. The roofing may be put on in different ways—either by an inch-broad turning-up of the length seams and soldering of the extreme edges, or by the different wood-slat systems. Best, however, is the method extensively used in England and shown in Fig. 2. Of the different kinds of lead hard lead is suited best, although for soldering this only lead

with with the hydrogen flame can be used. More recently, however, also chloride of lead with the soldering-iron has been employed. Its durability can be computed according to its thickness, ranging with certainty up to several centuries, although the varying quantity of precipitations (volumes of rain) of the different localities is an essential factor in the ultimate decomposition of the lead.

Zinc appears to be altogether ignored as a roofing material in this country, and, I am forced to say, injudiciously. It is true that of all the solid metals it is the most sensitive to the variation of temperature. But it possesses the desirable quality in moist air of becoming coated with a protective suboxide which prevents the further action of the air in such a manner that, according to scientific experiments instituted for the purpose, the final decomposition of sheets of zinc Nos. 13–14 would ensue only after 200 years, and for this reason it might in many cases be used more advantageously even than galvanized sheet iron. The many failures recorded in Europe could invariably be traced back to the want of care in the use of sheet zinc in considering the characteristics

*Metal Roofing.—Fig. 1.—Double-Locked Cross Seam in Copper.*

of the metal. Its linear expansion from the freezing to the boiling point is $\frac{1}{340}$, which would, with sheets of 7 feet long, amount to a difference of ¼ inch. Even though this limit be not attained in open air, still it must be considered that the contraction in cold does not take place as uniformly as its expansion in heat, whence can be concluded that all the sheets of a zinc roof must have full play for motion, and this is to be allowed rather freely. Of the different systems of applying zinc to a roof, using it in large sheets, that advocated by the Société Vieille Montagne, Belgium, as seen by Figs. 3, 4 and 5, has proven itself to be best. It can be recommended for roofs not subject to be continually walked upon, which have from 15 to 50 per cent. inclination, underneath which no injurious vapors collect, and which, besides this, are built in such a manner that snow-water cannot stand on them. It is peculiarly well adapted for cupola roofs, and it can generally be made made very useful in the services of architecture. The framing of the roof needs to be light, but must be dry, as moist wood prevents the formation of the suboxide upon the lower side. The boards must be narrow, not parallel with the water edges, but diagonal or crossed; nor must they be placed close together, so that they can move without interference and permit the free admission of air to the zinc. So far as regards thickness, zinc Nos. 13 to 14 is best; if thicker than this it is with greater difficulty worked, and at the same time it is not as durable. Being very vitreous in

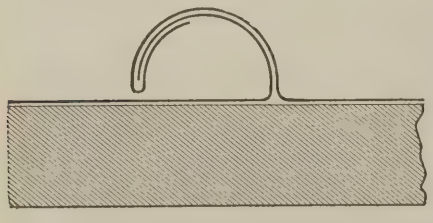


*Fig. 2.—Section Through Side Seam in Lead Roof.*

cold weather, it should be worked only in the favorable seasons. The simple cross seams, ¾ inch broad, are first bent on, next strips of leather are laid in at the end, and the sheets are on their long sides bent up 1⅓ inches at right angles, but at the same time as round as possible. This, if it can be done, should not be performed by means of hammering or the tongs, but with a bending machine of the size of the sheets, since the uniform stretching produced thereby is in favor of the strength of the roof. Beads are bent to the sheets on the water edge, and at the beginning of the wood slat, which is cut obliquely, the side turning up is carefully bent back in such a manner that a kind of seam is formed. The sheets must not

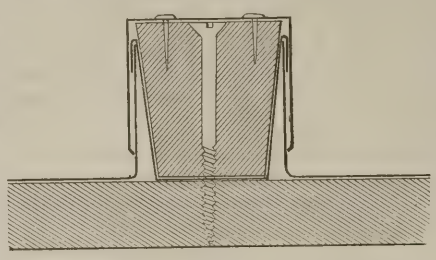


*Fig. 3.—Cross-Section Through Side Seams of a Zinc Roof Using Large Sheets.*

join with these edges, nor be soldered, but for sake of security there is laid on this place a piece of zinc, 6 inches broad, formed according to the shape of the slat, which in front engages with one seam in the water edge or over the projecting strip. The flashings must be made of equally thick material, and be of such a shape that they lie as closely as possible on the upturned edge of the sheets. They are 3¼ feet long, and at their rising end are provided with two slots for nailing; still the nails must be driven in only so far that the flashing can be slid, and the next succeeding flashing is soldered over it. The side flashing on the walls, chimneys, skylights, &c., should be fastened only with cap flashings, and the joints not be filled with lime mortar, but with a cement prepared with a silica paint. Where the use of sheets of so large a size appear to be unsuited, and if the roof has at least 25 per cent. inclination, zinc shingles, found of the most varying shapes, may appropriately be employed. The simplest and most practical are those of a square shape, shown in Fig. 6. These are made up to 1½ feet in size. Those with pressed ornamentation cannot always be recommended; some of them are apt to be crooked, or at least in such a condition that they soon require repairs, although they might sometimes be used for architectural effects. Finally, corrugated zinc is very well suited for roofing in a manner heretofore shown in *The Metal Worker*. Zinc roofing has been tried in the different countries of Europe on some of its public buildings, and whenever laid in an expert manner it has given a great deal of satisfaction.

Leaded sheet iron is to be recommended only with reserve. Its good qualities as compared to galvanized sheet iron—to wit, that it can be soldered without acids, and that the lead coating does not chip off—are counterbalanced by the drawback that this kind of sheet iron is almost invariably apt to rust too quickly. While in Europe, especially in France and Switzerland, I met with a large number of such roofs, most of them laid in a skillful manner, which after a few years of their existence required repairs. In fact, several of them were past help, being completely rusted through, and it became necessary to replace them with new ones, notwithstanding that they were painted with oil paint. This is caused by the want of care at the time of lead-coating the sheets in not freeing them sufficiently from the acid, which consequently continues its destroying action under the lead. Sheets with rust spots will frequently be seen coming from the warehouse. Dull spots in the lead covering show that the sheet is rusting under the coating. It is evident that those of this condition cannot be used for roofing. It remains to be seen whether a recent process of lead coating without acid, by using chloride of lead, will be successful.

Galvanized sheet iron also is open to a serious objection. The thin precipitate of zinc upon the iron is very vitreous in this unrolled state. As soon as iron coated in this manner is used for roofing the zinc exfoliates on the working edges, and the unprotected iron is exposed to destruction in the atmosphere. It is not necessary that the entire sheets should corrode; whenever the working places—that is, the seams—are rusted the roof is gone. If, however, the sheets are protected against the humidity of the boards by means of an underlay of tarred paper, and if the outside is at once coated with a good oil or silicate paint, which must be renewed at proper times, a very good roof is produced. The most usual styles for roofing with galvanized iron are: Standing seams, corrugated and in shingle form; the first can be used only for flat roofs. Those intended to be walked upon, however, should invariably be protected with a grating of strong wooden slats. This is very useful for walking, and the trifling cost is more than saved by the preservation of the roof. When used in corrugated form it cannot be employed for roofs of less than 25 per cent. inclination; and if the sheets are shaped before being galvanized, and used for roofing in the manner I specified in a former communication, it will be found to be an excellent and cheap roof. Such a roof is also made fire-proof by using the double iron brackets, Figs. 3 and 4, page 21, of the issue for November 14, 1885. For roofs of a greater pitch, steeples, cupolas, &c., the appearance of which is to correspond to the architecture of the entire structure, shingles can be recommended. For solid edifices they should have the following qualities: Sufficiently large and soft iron of a shape not too large, but simple and tasteful; sufficiently broad, lapping over, and lying close; the points of fastening—the holes for nails or hooks—must be situated in such a place that they will be overlapped. An underlay of tar paper cannot be said to be agreeable upon dwelling-houses; nevertheless, it is useful in every respect. Senseless ornamentation, lavish waste of the metal, whereby unnecessary expenses and increased weight of the roof timbering are caused, must be avoided. When starting the roof the connections with the water edge, chimneys, valleys, &c., should not be made as carelessly as I have frequently seen them. Where it is possible to introduce hanging seams it should be done. For storerooms and open sheds in general, of an

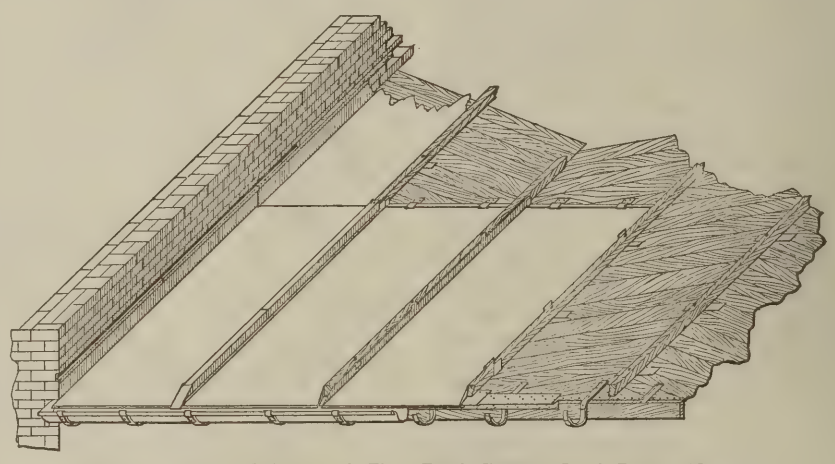
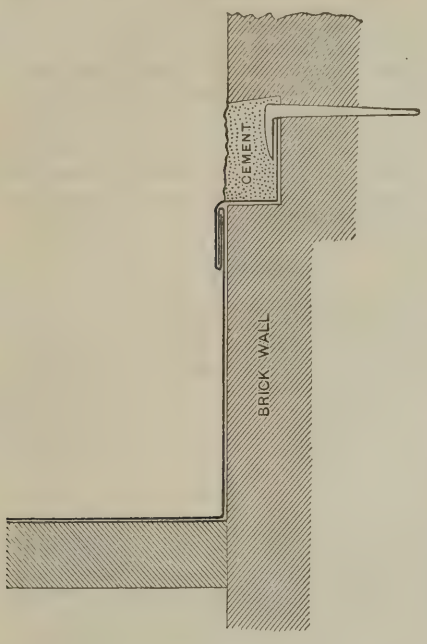


*Fig. 4.—General View of Zinc Roof Composed of Large Sheets.*

inferior value, a lath boarding without underlay suffices and is the cheapest for such purposes.

If galvanized sheet iron is to be used for roofing according to one of the slat systems, it is of utility only if used according to Fig. 3. The shape of the slats, naturally, can vary, but whether they thereby become better is doubtful. The want of




*Metal Roofing.—Fig. 5.—Section Showing Method of Flashing Against a Wall in Connection with Zinc Roofs.*

durability of many of these so-called "improved" forms can theoretically even be demonstrated. For instance, Figs. 1 to 8 of Mr. Ferns, of Montreal. Since slats are to be located only where, with flat roofs, free play is desired for the metal, they must also have the necessary space, without, however, jeopardizing the stability of the single sheets. But this cannot be obtained with a rectangular slat, even if rounded off, and therefore such work is without any utility. But it might be regarded as a pure and dangerous piece of nonsense if the ideas contained in Figs. 2 and 9 were to be put into practice. If done with copper, I might regard it as one of the many useless experiments. Taken as a whole, it requires only a small amount of practical experience to know how long ordinarily the nails and the soldering would last in such a roof; and it requires just as little theoretical knowledge to find out that, although variations of temperature can create an unequal bulging in the metal sheets, it can cause no vibrating area, as in Fig. 9, and trifling tensions are impossible even with those produced artificially.

I may pass by the subject of roofing with sheet tin by simply remarking that in this country it has become for a number of years the most extensively used material for roofing; consequently, we have great experience to guide us, and, besides this, almost every number of this paper contains articles on the subject. I will only say that I consider a well-put-on tin roof to be very appropriate for the ordinary run of dwelling-houses, and any advice how to do good work, necessary though it appears to be, is sufficiently well known, and generally heeded wherever good work is called for. Speculators' buildings, of course, will remain as is customary, in spite of good advice.

Concerning sheet-iron roofing, so far as corrugated iron and iron shingles are concerned, the remarks made about galvanized sheet iron also apply. Even though, as is but natural, in spite of a good coat of oil paint, it be less durable than the latter, it remains serviceable for a great number of years, and, because cheaper, it would be very appropriate for country houses, in place of the wood shingles. The roofing with large sheets of sheet iron, with standing seams, is decreasing in those parts of Europe where it was formerly much employed, and even in this country it will ultimately be used only to a limited extent. The main reason is at first due to the fact that it requires well-skilled roofers to make such a roof tight without cement. Next, too little attention is paid to the material itself, and the "coating of oil paint" applied upon it is frequently deserving of any other name except this. I state in the following what is necessary for a good sheet-iron roof.

In the beginning of the year of 1870 I assisted in covering the Kœnigswart Palace, near Marienhad (Bohemia), a spacious building, in the following manner: The sheet iron, of the best quality, size about 2¼ by 6 feet, was first cut at truly right angles, after which the corners were cut off; it was then placed in a hydrochloric bath. After the oxide was sufficiently taken off, the plates were thoroughly scoured with sand. This operation was performed in the vicinity of running water (a brook), and the sheets could be laid in the water and well washed off. Being dried with saw-dust, they received a good coating with linseed oil, next another one, to which a little well-ground ocher paint had been added. After these manipulations only the edged seams (double), as shown in Fig. 1, were bent to the sheets, slid together at the proper length

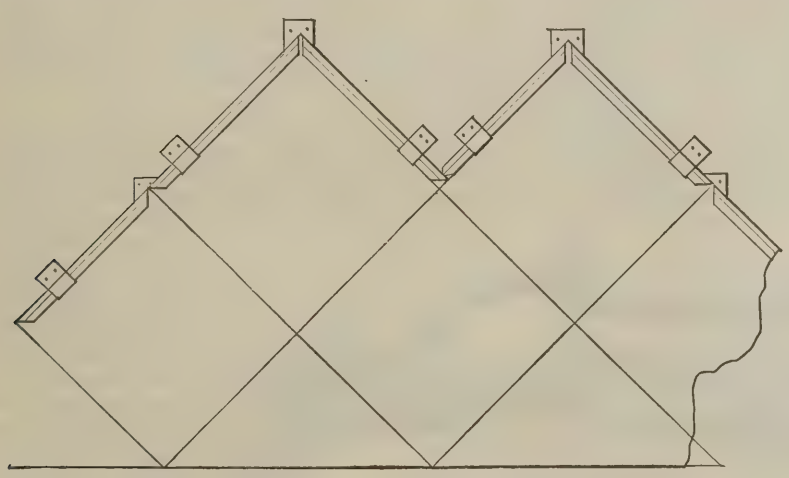


*Fig. 6.—Plain Tile Made of Sheet Zinc.*

of the strips, and the seams were hammered together. The rolled-up strips were laid upon the roof, where, in the customary manner, the long sides were with roofing tongs bent up. The fastening, as well as the seaming, was done as is usual for all standing seams, although great care was exercised to have everything exact. The laying on was done according to close calculation, in order to avoid anything like patchwork around chimneys and other side flashings. On these all the joints were seamed, and, according to situation, either single or double, running toward the roof. All cementing and soldering were avoided, the latter especially being very injurious to a sheet-iron roof, for the reason that the acid used for the purpose can never be thoroughly removed or neutralized again, and it will sooner or later attack and destroy the sheets where used. The roof was finally, after having been thoroughly cleaned, covered with a coat of oil paint, and I am satisfied that this is one of the best roofs of its kind.

But the required skill and careful work is costly, and for this reason such roofs are unpractical as compared to others; still, when I know that there are plenty of funds on hand, I would not dissuade any one from putting it on. Whoever has the taste for doing such an extra job will find that it possesses plenty of nice points to be studied, and, besides this, it is quite a change from

*Fig. 7.—Cross-Section Through Zinc Tile.*

our general humdrum style. It is the purpose of these lines to caution the tradesman not to be carried away by anything savoring of "inventions," but rather to go and study the important factors of systems of known utility, and to fathom them with diligence and intelligence. Economy of time and material for useful inventions, greater conscientiousness in work, and greater confidence of the building public, would be some of the results.

## REFERRED TO OUR READERS.

### Warm Houses.

*From* L. S. W., *Plain, Ohio.*—There is a subject which, it seems to me, has not been adequately discussed in the columns of *Carpentry and Building* in the past, and that is the methods of building houses to secure warmth in the northern portions of the country. Some advocate sheeting on the outside, others sheeting on the inside, and still others back plastering between the studding. I shall be glad to have practical readers of the paper give their ideas upon these methods. What is desired is the best and most economical plan.

*Note.*—Our correspondent's suggestion is one worthy of attention by our practical readers in general. There are several methods of making warm houses besides those which he names. He does not wish a theoretical consideration of the subject, but rather the results of practical experience. We hope our readers will act upon his suggestion.

### Planning of Cellar Stairs.

*From* S. B. B., *Appleton, Wis.*—I desire to ask Mr. Cornell, in regard to his plans of the house published on page 11 of the January number, if he is not a little crowded for headroom in his cellar stairs? It seems to me that this portion of his study has not been as thoroughly considered as it should have been.

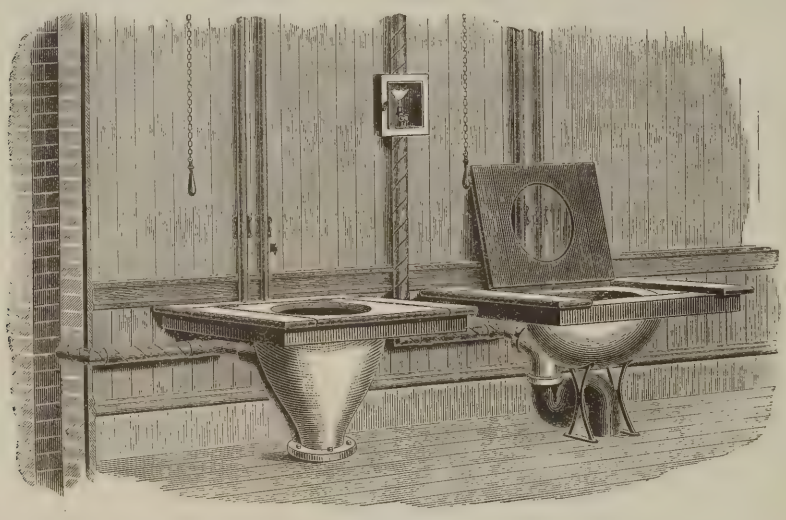
### Frozen Lime.

*From* G. B., *Superior, Neb.*—We have had a severe winter in this part of the country, and in the erection of a school building cold weather caught the plasterer before his work was done. As a result 42 barrels of lime were frozen up after the lime had been slackened in a mortar bed. I find a great diversity of opinion on the subject of freezing and thawing of mortar or slaked lime before being mixed with sand. I would like to hear from some of the practical readers of *Carpentry and Building* on this question. If slacked lime is injured by freezing, what is the nature of the injury? In other words, how does frost injure the lime? If it does not injure by freezing, what is the best way to handle it so as to retain its qualities after the freezing has been accomplished? Would it be better to run more slacked lime on the present frozen bed, or is it advisable to let the present lime remain to thaw out in the spring? Full particulars on this point will be greatly appreciated.

# NOVELTIES.

### The Ventilation of Plumbing Fixtures.

It is more generally known by practical sanitarians and plumbers than by the general public, architects and builders that water-closets and other plumbing fixtures can be kept sweet and inoffensive by a very simple ventilating system, connections for which are provided in many instances in the fixtures themselves. We do not allude to the ventilation of the soil-pipe, which, in almost all communties, is required by the Board of Health to extend above the roof, with an open top. We refer to a system of ventilation by which the foul odors in and about the fixtures may be avoided, or rather shall be drawn away. All that is necessary is to connect a ventilating-pipe with the fixture at the proper place and provide a draft through the pipe either by means of a gas-jet or by connecting the opposite end with a hot flue. The kitchen flue in dwelling-houses is almost always hot, and, accordingly, a draft supplied in this way is in most instances a simple affair. While ventilating a soil-pipe into the kitchen flue would not be recommended, there is no objection to a connection of the kind we mention. In case ventilation of this kind is decided upon the question of the kind of pipe to use for the purpose becomes one of prime importance. Messrs. Lamb & Ritchie, of the Boston Spiral Tube Works, with office and factory at Cambridgeport, Mass., have issued a neat circular showing an arrangement of pipes for this purpose in connection with water-closets of modern design, which they are distributing in large quantities for the purpose of stimulating a demand for their spiral seamed pipe, which appears to be specially well adapted for the purpose. Fig. 1 of the accompanying engravings is from the circular in question. Two methods of running pipes are shown. One employs a gas jet for inducing a circulation of air, while the other connects with a hot flue, thus accomplishing the same end without the expense of gas. In their works at Cambridgeport a practical application of this system is in operation and is often shown to visitors, to their great satisfaction. The pipe there used runs some 50 or 75 feet from the closet and connects with the stack of the steam boiler of the establishment, which suggests how this plan may be advantageously employed in manufacturing concerns. A more satisfactory result than they have attained by the means named is hardly to be desired. There is nothing new in the general idea, and the only object that this firm have in popularizing it is to educate the public and make a demand, as we have already said, for the pipe which they manufacture. This pipe is of a character to be put in place by plumbers, and can be easily arranged without soldering. From a circular which this firm have recently issued we make the following extracts:



*Novelties.—Fig. 1.—Application of Spiral Seamed Pipe to the Ventilation of Plumbing Fixtures.*

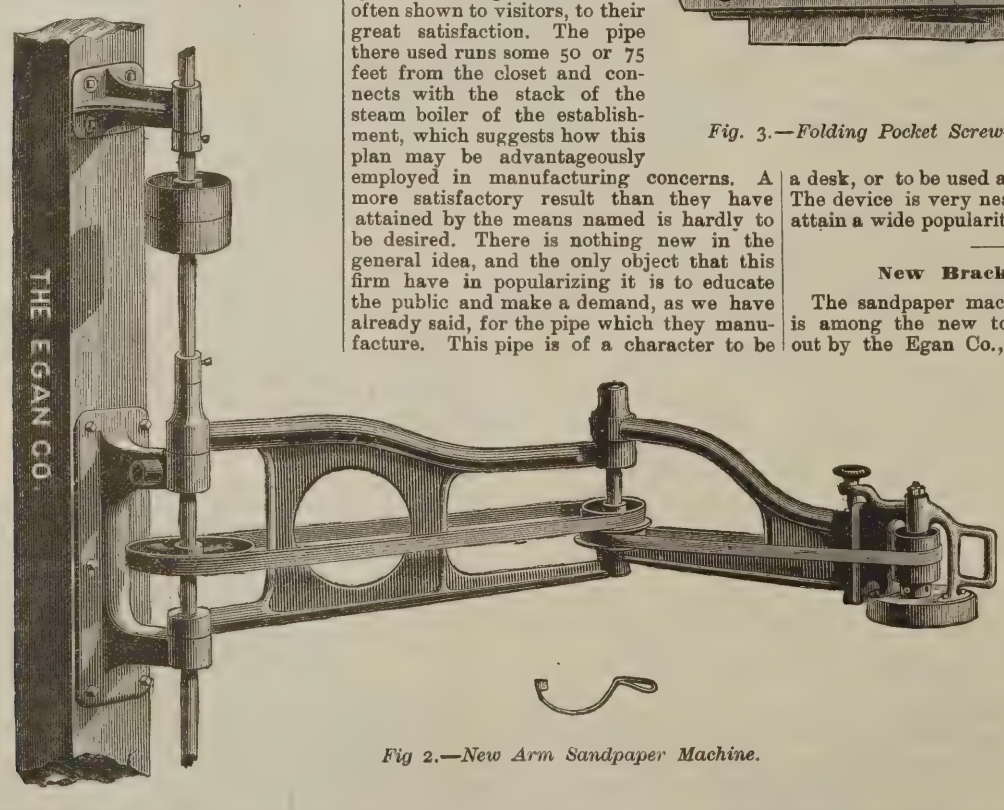



*Fig 2.—New Arm Sandpaper Machine.*

"The owner of a house often takes no stock in a plumber's sanitary improvements, because he cannot see for himself how they work or the good they do. But here is something he can appreciate at once. He quickly notices the difference between the usual foul smell in his bathroom and none at all, even when the closet is in actual use. There is no patent on this system, and it is also of great service applied to urinals and stationary washbowls. The essential point in all cases is to ventilate into a hot flue, like the kitchen chimney. Where this cannot be reached the air in the pipe can be heated by other means. Appliances are sold for doing this by lamps or gas-jets. A cold pipe running out to the open air will not do the work. Closets and hoppers are made with place for the pipe, but it can be applied to any closet by running it into a metal box attached to a slot in the seat." Ritchie's spiral pipe is sold by jobbers generally, and can be obtained in any part of the country at reasonable cost.

### Pocket Screw-Driver.

The Nashua Lock Co. some time since devised a folding screw-driver for pocket use, designed particularly for traveling salesmen, hardwaremen and others, for convenience in showing their goods. It proved to be such a handy article that the idea suggested itself of supplying it to the trade for the benefit of those who might desire such a tool. The nature and design of the article will be understood by an examination of Fig. 3 of the engravings. In some particulars the article resembles the folding keys which for many years past have been furnished with certain kinds of door locks. When folded it measures a little less than 3 inches, and when extended measures 4½ inches. The ring of the handle is sufficient to afford ordinary leverage, while the construction is such that it may be used half-open, thus affording a material increase of leverage Such a tool as this is very convenient for carpenters and other mechanics for pocket use, or to be kept in a convenient drawer in a desk, or to be used about small machines. The device is very neat, and will no doubt attain a wide popularity.

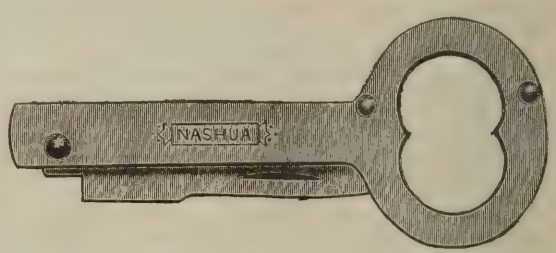



*Fig. 3.—Folding Pocket Screw-Driver, Full Size.*

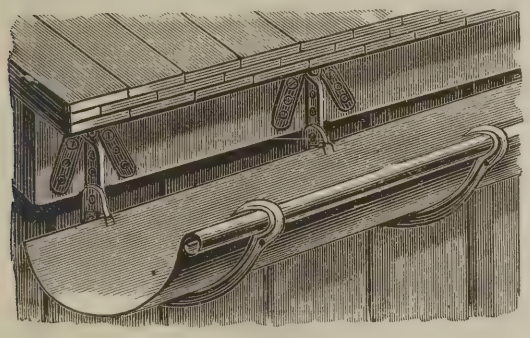
### New Bracket Sander.

The sandpaper machine shown in Fig. 2 is among the new tools recently brought out by the Egan Co., of Cincinnati. This device, it is claimed, is constructed in such a manner as to combine lightness and great strength, at the same time allowing all dust to be conveniently drawn away as fast as made. A special feature of the machine is the vertical adjustment of the disk, allowing a large variation of thickness in the stuff to be operated upon without necessitating an adjustment of the disk. When desired the machine is fitted to take in bits by removing the hand disk, in which form it serves as a boring machine of wide range. The frame is hollow and is cored throughout. The frame is so constructed that all the dust is drawn clear through it and either passed into the shaving box or a wet barrel, so as to avoid all

annoyance. The hinge or swinging joint in the middle is susceptible of any doubling or swinging required, and is ingeniously constructed without loose joints and without lost motion. It is so arranged that one side of the largest door can be sanded without moving it around on the bed of the machine. The disk or sandpaper head is very conveniently arranged. The sandpaper can be instantly changed by removing or loosening the screwed band or hoop. The head has a vertical adjustment regulated by the hand-wheel shown in the cut. The exhaust can be a small pipe attached to the main fan in the shop, or when desired a small fan made specially for the place is provided, which answers a very satisfactory purpose.

### Supports for Hanging Troughs.

Berger Bros., of Philadelphia, have for many years past devoted special attention to the construction and manufacture of supports for hanging troughs. In the course of their business they have developed a number of ideas which cannot fail to be of interest to our readers. For the most part the adjustment of hanging troughs, occurring as they very generally do on buildings of the cheaper class, is relegated to the tinner without a thought on the part of the architect or builder, but since there are good



*Novelties.—Fig. 4.—Berger Bros.' Method of Hanging Troughs Against Drip Board.*

ways and poor ways of putting troughs in place it is only right that they should be in a position to discriminate between them, and to choose intelligently in this matter as well as in others. One of the leading features of the different systems which the firm referred to are introducing is that of supporting the trough from below instead of suspending it from above, as is very generally the practice. The argument in favor of a bracket or a clasp engaging the trough from below are several, among which may be mentioned that of relieving the trough from all obstructions across its width. At the same time excellent support is obtained, and the length of the trough is divided into sections or panels by the fixtures employed. Messrs. Berger Bros. have given special attention to devising fixtures based upon the principles we have referred to that can be used in almost every conceivable place. While it would seem to be expedient to construct roofs so as to adapt them to the use of certain fixtures, this is so generally neglected that the fixture-maker finds it necessary to adapt

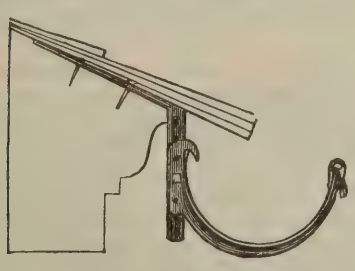


*Fig. 5.—Bracket Nailed to Roof Boards.*

his goods to all varying circumstances. Messrs. Berger Bros. are firmly impressed with the idea that a hanging trough is one of the best forms of gutters that can be employed, and that it is not more generally used upon buildings of the better class for lack of good supports than for any other reason. They claim that gutters are frequently concealed in cornices for no other reason than that reliable fixtures are not at

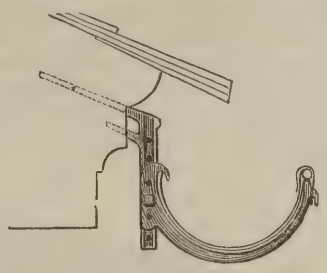


*Fig 6.—Bracket Fastened by Driving Into End of Rafter.*

hand to insure good construction of troughs hung outside of the building. The evils of concealed gutters are too well known to our readers to need attention in this connection. The advantages of hanging troughs are also generally recognized. In Figs. 4 to 7 are shown different varieties of bracket fixtures supplied by this firm, and they illustrate in some measure the care and attention that have been given to this industry in order to adapt the fixtures to the varying conditions to be met at the eaves of the roofs. Fig. 4 shows a trough suspended in a bracket attached to a fixture which nails against the facia or drip board under the projecting ends of the shingles. The flanges for nailing are double, and are perforated to such an extent as to make it possible to choose the most solid portions of the board for the nails. Fig. 5 shows another form of the same style of hanger with a tang adapted to run under the shingles and nail to the sheeting boards. This form of hanger is very generally put in place before the shingles or slate are laid, but nevertheless it is occasionally employed by running under the shingles. This bracket is made of different angles to adapt it to different degrees of pitch. Fig. 6 shows another variety of bracket,

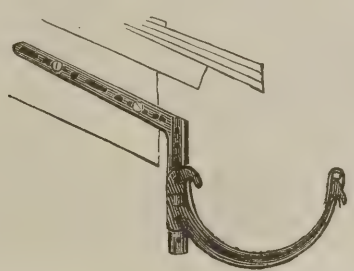


*Fig. 7.—Bracket Nailed to Side of Rafter.*

which is fastened by driving into the ends of the rafters. The driving point is reinforced by a bracket or brace, below which secures a very strong support. Different angles of driving irons of this kind are also supplied. Fig. 7 shows another form of bracket adapted to nail to the side of the projecting rafter. Different angles of this are likewise supplied. It will be noticed in each case that the pitch or fall of the trough is secured by adjustment between the arm of the bracket and the clasp which goes under the gutter. Several different degrees of fall per running foot are possible by the adjustments provided. The trough is fastened securely in the clasps, and, when erected, presents a workmanlike appearance, as shown in Fig. 4. Among the circulars issued by this firm is one showing at a glance the different forms of fixtures which they supply, and another containing a diagram giving names to all the different styles of troughs in common use throughout the country, thereby systematizing the business and facilitating orders. Both of these are desirable for reference by builders and architects.

### Anti-Friction Sash Pulleys.

The Moore Mfg. Co., 163 and 165 Lake street, Chicago, are putting on the market an anti-friction sash pulley, shown in Fig. 8, the essential feature of which is illustrated in Fig. 9. With the anti-friction roller bushings as shown these pulleys are described as noiseless, running smoothly and very durable. They are made in two sizes, 2-inch and 2½-inch. The manufacturers make the point that these pulleys are sold at so reasonable a price that they should take the place of the common sash pulleys. They also suggest that in ordering the trade specify

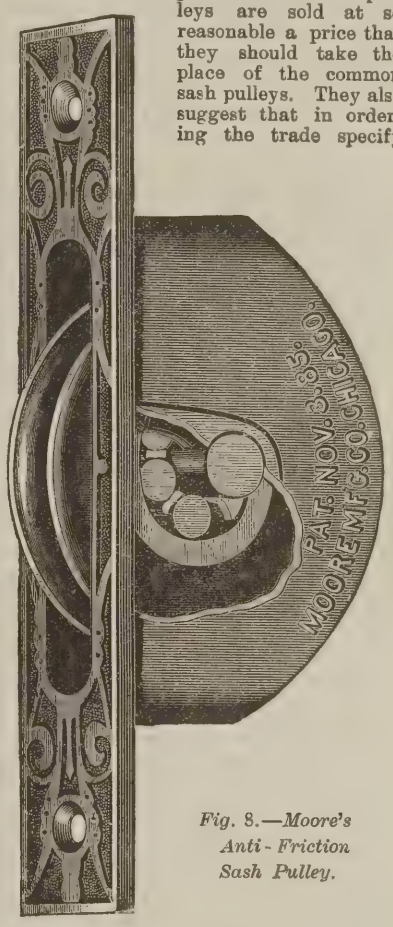



*Fig. 8.—Moore's Anti-Friction Sash Pulley.*

whether round or square grooves are wanted. If not otherwise specified, they will send round grooves.

### Hanging Troughs in Long Lengths.

From time out of mind tinners have been supplying hanging troughs composed of short sections joined by solder. It is well known to builders that troughs give out earliest in the soldered seams. Hence it does not require argument to show that the fewer seams that occur in troughs the better the general quality of the work. For some time past Messrs. Hatten, Galpin & Co., of

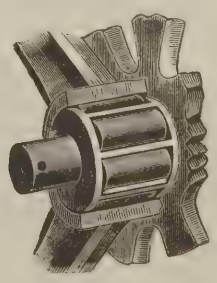


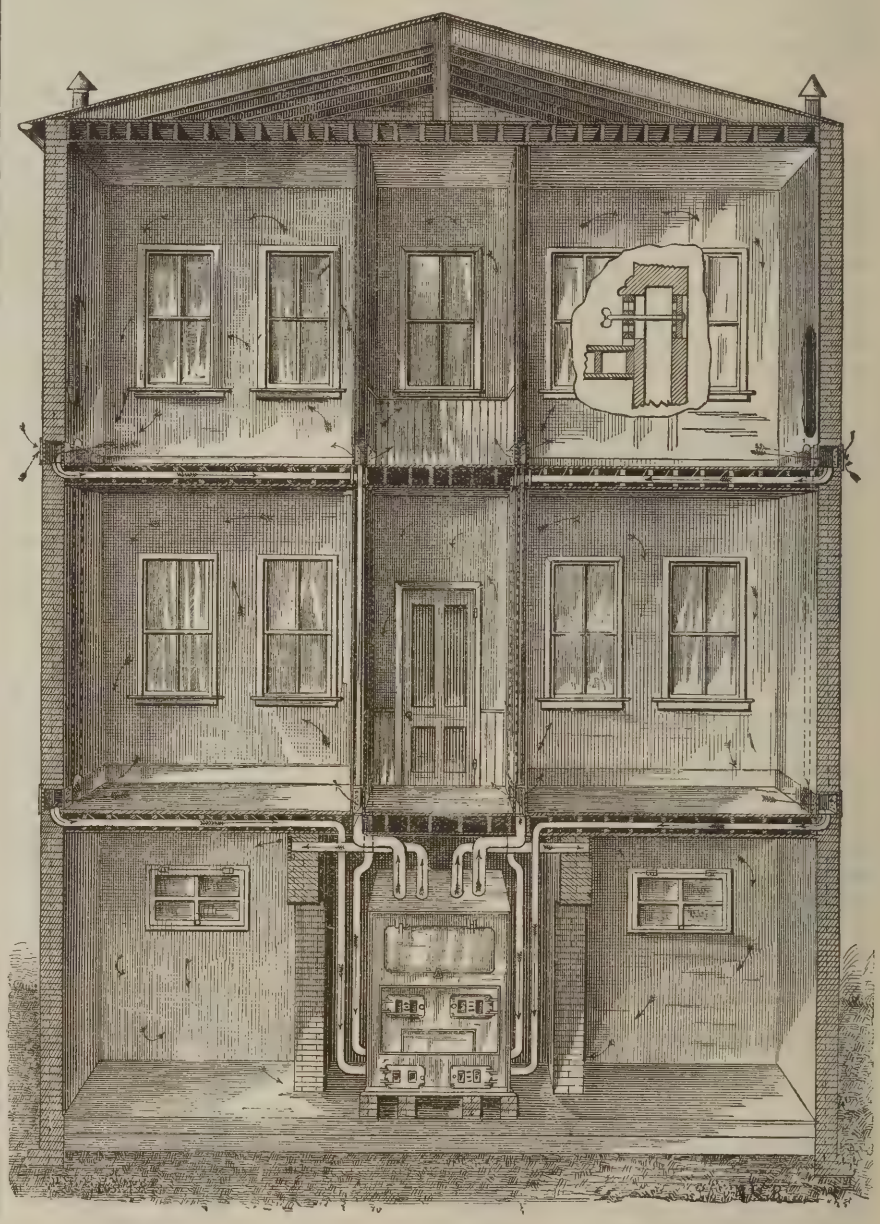
*Fig. 9.—Anti-Friction Roller Bushing in Moore's Sash Pulleys.*

Binghampton, N. Y., have been offering to the trade an 8-foot seamless trough made in tin, galvanized iron, copper and other metals. Different sizes are made in each of these materials, ranging from 4 inches cross measurement by 2 inches vertical depth

to 8 inches cross measurement by 4 inches vertical depth. The beads are from ½ inch to ⅝ inch in diameter, varying according to the size of the trough. In addition to their standard patterns they also make special sizes and styles to order to comply with architects' specifications. The troughs of different sizes and kinds pack compactly in cases of 25 pieces each, or 200 lineal feet, and are safely transported to any part of the country. The makers claim that these troughs are sold at figures that make them cost no more when on the building than an ordinary pieced trough, while at the same time they afford a reasonable profit to the one who puts them up. They also supply angles of superior quality, thus reducing the labor of putting in place to the smallest possible amount. We have recently had the opportunity of examining the work produced by this firm, and also the material in bulk from which it is manufactured. The work is remarkable for its neatness and accuracy, and particularly for the straitness of the beads. The materials out of which the gutters and troughs are manufactured are made expressly for this purpose and are imported to order. The advantage of long troughs over short lengths, as mentioned above, are sufficient to warrant the attention of architects and builders to this feature of construction.

### The Ordway System of Heating and Ventilation.

The Chicago Heating and Ventilating Co., with office at 205 West Madison street, Chicago, are introducing a system of heating and ventilation applicable to both public and private buildings, and which is based on what are known as the Ordway patents. One of the leading features of this system, which employs hot air as the medium of heating, is in the construction of the furnace. Instead of the pipes, which convey the heated air to the several rooms, drawing their supply from one common chamber, the furnace is subdivided so as to give each pipe, and accordingly each room to be heated, its own distinct supply of air. It is claimed by these means that better control of the heating system is obtained and that certain other incidental advantages pertain to the method. In Fig. 10 is presented a vertical section through a city house, showing the furnace set in the basement, with a system of pipes leading to the different rooms. It also indicates in the lower story how a system of return-pipes may be used so as to circulate the air of a given room through the furnace and back to the room again, thus insuring more rapid heating than would occur if fresh air was drawn from the outside. This is one of the incidental features of the system, and is not used exclusively. It is combined with methods by which outside air may be drawn through the same pipes, and also with means by which the foul air from the room is drawn upward and thrown out of the building. This latter is accomplished by openings into heated flues, the flues being warmed by hot air from the furnace. The cold-air supply is taken in each instance from the level of the room to be warmed, and, accordingly, many of the objections to the ordinary supply to furnaces in city houses are overcome. From these very brief particulars it will be seen that the system is elaborate in scheme, and that it admits of various modifications both in arrangement and management to meet special requirements. The engraving does not present a section of the furnace. This we can make intelligible to our readers by a brief description. An engraving of it, which would have been of interest to our readers, no doubt, has been omitted on account of the pressure upon our columns at this time. The furnace may be described as containing in a chamber back of the fire-pot, and located where they would be heated by the passage of the flames and gases of combustion, a series of vertical tubes corresponding in number to the pipes leading to the different rooms of the house. These tubes at the bottom connect with the different pipes leading from the rooms and from the several supplies of fresh air. The divisions in the furnace are such as to throw the flames and gases against the largest possible area of surface of these tubes, thus bringing their heating capacity up to a maximum. To the upper end of each of the pipes referred to there is connected the ordinary hot-air pipe leading to the room to be heated. This arrangement of pipes secures a continuous passage of hot air from the furnace to the room and then back to the furnace. By means of dampers provided for the purpose fresh air from the outside can be drawn to the furnace through the return-pipes and in turn discharged into the room. In this case the air drawn from the room is discharged into the ventilation flues leading to the roof. Referring to the common plan of warming buildings by furnaces where the pipes all lead from a common drum or air chamber, Mr. Ordway points out some of the difficulties encountered as follows: "When several rooms are warmed by a single furnace one register sometimes draws against others, thus interfering with the currents of air sent through them. The registers nearest the furnace and those at the ends of upright pipes exhaust the supply which should be directed to rooms remotely situated. The momentum of the warm air is retarded by being broken and checked in the drum. The currents are further broken by coming in contact with each other and by being directed into separate flues. The pressure or head is largely destroyed by these irregular and conflicting currents. These difficulties are overcome where the heating and delivering of the air is managed in a continuous flue." From this it will be seen that in some respects this system secures for each room the advantages of a separate furnace devoted to its requirements exclusively. The furnaces employed in the ordinary system are made of various sizes and with different numbers of tubes, adapted to special requirements. The company have issued a very neat pamphlet explaining the system more in detail than we are able to do in the space at our command, and containing several illustrations of its application. The system is unique, and will no doubt be examined with much interest by those of our readers who are in need of anything of the kind.

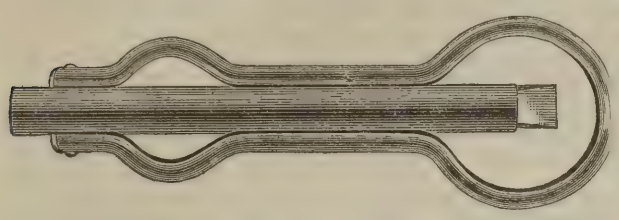


*Novelties.—Fig. 10.—System of Heating and Ventilation Followed by the Chicago Heating and Ventilating Co.*

### Telescope Pocket Screw-Driver.

Fig. 11 shows the appearance when closed of a new form of pocket screw-driver called the Telescope, which is being put upon the market by George H. Moseman & Co, of No. 28 Cliff street, New York. It derives its name Telescope from the peculiar construction of the handle. The shank of the screw driver is pivoted, as shown to the right in the engraving. The shield which slips over the shank is slotted at the sides and is held in place by a catch in the narrow part of the handle. When the screw driver is opened, the shank being in the reversed position from that shown in the engraving, the shield is slipped up into the handle so as to be in the same general position as shown in the cut. It is, however, reversed, being

end for end, as there shown. The novelty in this screw-driver is in the handle, which is patented, and which is also applied to various other small tools, thus making them



*Novelties.—Fig. 11.—Telescope Pocket Screw Driver.*

equally portable. The engraving shows the tool full size. When opened it measures 5¼ inches in length. The screw-driver seems to be well adapted for small screws and light work in general. It is finished by nickel-plating and is very neat. An advantage claimed for this screw-driver over other forms of reversible tools is the short length when folded and the comparatively long length when opened, which is attained without loss of leverage. The latter feature depends upon the sliding tube or shield, which, as we have explained, comes back into the handle and is locked in position, thus holding the tool firmly whether opened or closed.

### Olmsted's Improved Miter-Box.

L. H. Olmsted, Corona, N. J., is putting on the market the miter-box of which an illustration is given in Fig. 12. The frame is made of hardwood selected for the purpose and of boards 1 inch thick, and consists of two upright pieces which are fastened rigidly to the bottom piece. Upon the upper edges of these two uprights are fastened irons made the exact angle to form a miter and serve as a guide for the saw. The two

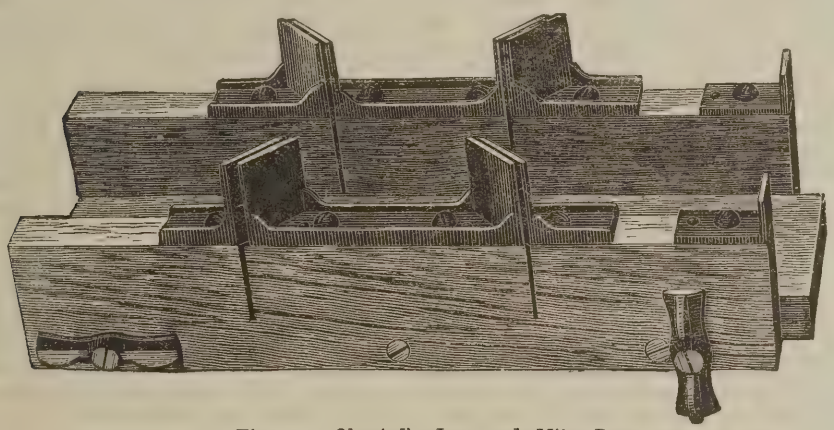


*Fig. 12.—Olmsted's Improved Miter-Box.*

center irons on each side are fastened firmly and are not movable, but the other four irons facing them are slotted where the screws pass through them, and can be moved up to and from the fixed irons, thereby adjusting the space between the irons to fit any thickness of saw blade. In using these irons the upright side pieces are made only about half the hight that they are made when the miter-box consists entirely of wood, thereby making the frame more substantial; while the irons being made sufficiently high and broad to make a good bearing upon the saw blade, and the space between the irons being open only sufficiently to allow the saw to move freely, it is claimed that perfect work can be be done with this miter-box. The further advantage is pointed out that the saw will not cut the frame away, as it will be held in a perfectly upright position. It is also intimated that an ordinary handsaw can be used as well as a bucksaw, inasmuch as the blade cannot spring in this miter-box. It will be seen that upon the upper edge and at one end of the uprights two iron gauges are fastened which are used to guide the saw when sawing a square cut. By this method the miter-box can be made about 4 inches shorter than when a slot is used, and it is said to be found in practice more convenient. The two buttons screwed to one side of the uprights are used when turned vertically to form a top or catch when the miter-box is used on the edge of a table or bench. When the buttons are turned horizontally the miter-box can be screwed down to a bench, for which purpose holes are bored in the bottom. When putting the saw into the slots the teeth of the saw should be inserted below the irons. Of this miter-box two sizes are made, the smaller being about 3 x 1¾ inches, and the larger 4 x 2½ inches, inside measurement. They are of good workmanship, neatly finished, the ironwork painted and varnished and the frames finished in oil varnish.

### Wheeler's Patent Perfect Screw-Drivers.

Fig. 13 represents a new screw-driver which is manufactured by the Acme Shear Co., Bridgeport, Conn. The handle is described as made of the best air-furnace malleable iron, and the blade of the best steel, rolled especially for this purpose, and forged out under the hammer by hand. The handle is stiffened on the inside with ribs. The blade, ferrule and handle are united under heavy pressure, and secured by a steel pin which passes entirely through the ferrule, handle and blade, as shown in the cut, in a manner which makes them practically one. The manufacturers, in referring to this tool, allude to it as handsome in appearance, light and well balanced, allowing of a good grip, and stronger than a wood handle can be made. It is intimated also that the end of the handle can be used to good advantage for setting screws into wood. It is made both plain, polished and nickel-plated, in sizes of blade running from 1½ to 12 inches. Whatever may be the utility of the usual form of carpenters' screw-drivers, and however desirable may be some of the special forms occasionally employed, there will always be found use for an iron-handled tool, particularly of the smaller sizes, which can be used as a hammer as well as a screw-driver, and such a want this article seems to supply.

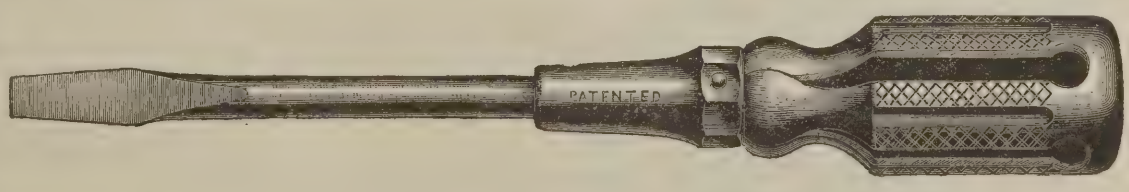



*Fig. 13.—Wheeler's Patent Perfect Screw-Driver.*

### Adjustable Anti-Friction Sliding Door Hanger.

Fig. 14 illustrates the Adjustable Anti-Friction Sliding Door Hangers made by the American Mfg. Co., Philadelphia, for whom the Lloyd & Supplee Hardware Co., 625 Market street, Philadelphia, are agents. The door hangs from the top, as shown in the illustration, the rollers bearing on a hardwood rail. Along the entire base of the hanger or yoke runs a malleable-iron wedge which gives a bearing the full length. These wedges are provided with set-screws at their smaller ends, by means of which they may be adjusted and the door raised in case it

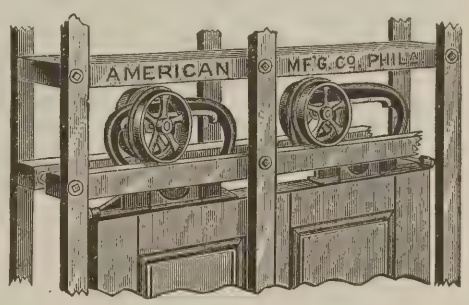



*Fig. 14.—Adjustable Anti-Friction Sliding Door Hanger.*

sags or settles. A special feature of these hangers, referred to by the manufacturers, is that the adjustment of the set-screws does not alter materially the position of the wedges, which continue to bear their entire length. The portion of the hanger on which the wheels run is milled to a true and even surface; the wheels are also carefully turned, so as to give a perfectly smooth motion. The hangers are adapted to doors of all weights, either single or double, and can be readily adjusted by means of the set-screws above mentioned. The American Mfg. Co. send out with their hangers full directions for putting them up, and, where instructions are followed they say no difficulty will be experienced in adjusting them to the doors. The goods are described as carefully and accurately made, and are put on the market with confidence that their merits will be appreciated.

### Bricks and Tiles of Glass or Grit.

We take the following from the excerpt minutes of the British Institution of Civil Engineers: "The utilization of the heaps of residue from the operations of the looking-glass manufacture has been successfully effected, on the system of F. Motte, in the production of white bricks and stones. In polishing mirrors the surfaces are rubbed with platforms of wood framed in cast iron, interposing fine sandstone or white quartzose sand, with the addition of water. The water, as it escapes as mud, carries with it the sand employed in grinding, mixed with glass and cast iron. The proportion of glass as impalpable powder is about 15 per cent. of the weight of the sand, and there is 2 per cent. of iron. The muddy water is delivered into basins where the solid matters are deposited. The deposit is collected, and ultimately becomes enormous heaps. It is

very absorbent, and holds at least 30 per cent. of water. The solid matter is dried to a convenient degree, brayed, kneaded and put into molds of the required form, in which it is subjected to a pressure of about 2 tons per square inch. The pieces thus molded are dried, and burnt in a kiln at a temperature above that of melting glass, about 3000° F., the glass, by its melting, constituting the cement by which the silica is held together. The soda in excess at this temperature combines with the silica. The iron is reduced, and a perfectly white product is obtained. This new material is light; its density is only 1.50, while that of clay bricks is 1.85. This material, consisting of silica and glass, is usefully employed in chemical manufactures. The bricks are used to line lead chambers. They resist the action of sulphuric acid and hydrochloric acid. They are more or less compressed, according to their destination, and their power of absorption varies from 20 per cent. to 25 per cent. They are unaffected by frost. They have a crushing resistance of from 2½ to 2¾ tons per square inch, whether dry or after 40 days' immersion in water. The material, in mixture with other substances, makes fine clays, paving stones, &c. In architecture it is ornamental. It is homogeneous, and is easily cut. In price, bricks of the new material vary from £2 to £4 per thousand."

## TRADE NOTES

We have received a pamphlet containing a sketch of the recent meeting of the American Forestry Congress, at Boston. It has been issued in anticipation of the publication of the full report of its proceedings, including the papers read. The present publication has been put forth for the purpose of informing the general public of the character of the work of the congress, and to invite co-operation with it. The statistical parts of the forthcoming volume are of great importance. Forest preservation, utilization of timberman's waste, and the discussion of means to diminish loss by fire, are among the subjects considered. The secretary of the congress is B. E. Fernand, No. 3 Burling Slip, New York City.

The Boston Terra Cotta Co. have issued a neat little pamphlet entitled "Supplement to Part V, Catalogue." The designs include chimney tops, blocks with letters, figures and monograms, date panels, rosettes and molded tile of numerous designs. In some cases the designs are accompanied by a statement of the buildings upon which they have been used or for which they were specially made. A considerable number of the designs have emanated from New York City architects. The catalogue is supplemented by a list of prices.

The Egan Co., of Cincinnati, send us copies of letters received from different wood-working firms with reference to the satisfaction experienced in the use of different machines which they have manufactured. Among those that are highly commended are their double-drum sanders and their automatic knife grinders. We understand that of the former machines a considerable number have been sold in Canada as well as throughout the United States.

William T. Cotter, formerly of the firm of Demens & Co., Longwood, Fla., informs us that he has sold his interest in the establishment named and has opened an office at Sanford, Fla. Mr. Cotter's card gives his business as that of architect and builder. He informs us that he will give particular attention to all kinds of designs of building, including designs of furniture, interior finish, &c., and that estimates will be made on work to be executed in any part of the State.

We mentioned some time since an organization in Brooklyn looking to the instruction of apprentices and other young persons in industrial and artistic drawing. The club is known as the Pencil and at present has its office and lecture-rooms in the Safe Deposit Building, corner of Clinton and Montague streets. Courses are arranged and instruction is also given to individual students desiring special instruction. Among the courses one has been provided with special regard to the needs of carpenters and builders. Competent instructors are employed and the work, which has been in progress for over a year, has shown most excellent results. Those of our readers who desire information can obtain the same by addressing the club at the address named.

The Porter Iron Roofing Co., Nos. 101 to 105 West Front St., Cincinnati, Ohio, have issued a circular requesting correspondence with builders, contractors, hardware dealers and others with reference to their iron roofing. They are anxious to make arrangements with desirable men in each town in the country for the introduction of their specialties, and freely offer a commission on all sales made to those whose names are sent in by their correspondents. The company have been in the roofing business for many years past and enjoy a very large trade.

In another column in this issue John Brower, of 81 Murray street, N. Y., directs attention to angular barn-door rail, which he is supplying in cases of 200 feet each.

Messrs. Seymour & Whitlock, Newark, N. J., are calling attention to an improved foot-power mortising machine, an illustration of which appears in connection with their card in this issue. The machine is claimed to be heavily and substantially built and accurately fitted in all its parts. They offer a descriptive catalogue and price list to all applicants.

The American Endolithic Co., with office at 338 East Twenty-Seventh street, New York, have on exhibition a collection of what they call "Endoliths." The exhibition is at 123 Fifth avenue. A catalogue which is before us shows that no less than 36 samples are shown. Endoliths may be described as colored marbles of artificial production. This definition, however, is scarcely satisfactory without further explanation. The base of the work is natural marble and the coloring is effected by a chemical process which does not simply stain the surface, but penetrates to a considerable depth, making the work in reality colored marble. Accordingly the company claim for their work that it is not imitation of colored marbles, but the very marbles themselves. It is also described as the development within the substance and below the surface of marble of paintings or designs in monochrome or color, whereby the art of painting is combined with the durability of sculpture The processes employed are based upon the researches of an American chemist, Dr. Hand-Smith. The various chemists of the company, under the superintendence of Dr. Hand-Smith, have produced almost all the colored marbles that are known in the arts, using white marble as the base. The exhibition above referred to shows the results of the company's work in a very satisfactory manner, and offers to the art-loving public a new opportunity of appropriate decorations and fine-art effects in public and private buildings.

A supplementary sheet to their regular catalogue, issued by the Peerless Brick Co., Philadelphia, is at hand. The illustrations number 23, and are in the form of isometrical diagrams. The engravings are in the high style of art usual to the catalogues of this company.

Messrs. J. B. Shannon & Sons, of Philadelphia, have for a long time past been making a specialty of fine brasswork for interior decorations, including such work as is required in offices, banks, &c. Their long experience, together with special facilities for the work, give them an enviable position in this line of trade. Their card will be found in another column.

We have received from C. G. Horton, wholesale lumber broker, with office at No. 101 West Fourteenth Street, New York, a copy of the sixth number of "Horton's Annual." The work is in the form of a pamphlet of 40 pages, of convenient size for carrying in the pocket, and contains rules for the inspection of hardwood lumber for the New York market, suggestions to shippers and hints to manufacturers. It is replete with the kind of information that shippers of lumber to this market are constantly in need of. Almost all the leading kinds of wood are considered, with rules, and in some cases the rules are supplemented by comments from some recognized lumber authorities. Quarter sawing is considered, with illustrations. An engraving is also presented to show how walnut logs should be shaped in order to make them acceptable in this markt. A diagram is likewise introduced showing how sweet-gum lumber should be manufactured. A page of illustrations shows the principle upon which warping and shrinking proceed.

We have received from A. Y. Lee, of Pittsburgh, tintypes of the elevation and floor plan of the Baptist Home Building, recently designed by him for erection at Chatauqua, N. Y. The building is attractive in its general appearance, and yet inexpensive in features of construction, and seems to be well adapted for the purpose for which it is intended.

Merchant & Co , of Philadelphia, present to our readers this month an extract from one of our Western architectural contemporaries with reference to the success of their guaranteed roofing plates, which have been before the public for nearly two years past. This firm have built up an enviable trade on the basis of fair dealing and excellent quality of goods. They have well-nigh restored tin roofs to the position they occupied some years since, before cheap plates became the rage.

Messrs. Butler & Constant, No. 18 Warren street, New York, show in another part of this issue the dumb waiters and hand elevators which they manufacture. They also direct attention to several specialties for which they are first hands.

A H. Abbot & Co., of No. 50 Madison street, Chicago, direct the attention of our readers, in their card in another column, to their supply of drawing instruments, papers, tracing cloths, &c. A catalogue is offered to all applicants.

Messrs. Pierce, Butler & Pierce, of Syracuse, N. Y., present in their card in another column an illustration of the Florida boiler, which they claim is the best and cheapest steam heating boiler in the world. It is described as self-feeding, automatic and portable. Other advantages which this apparatus possesses are enumerated.

Sharpless & Watts, 1522 Chestnut street, Philadelphia, are directing attention to Minton's decorative tile for floors, also to sills, earthen mantel facings, &c. They carry a complete line of fireplace appurtenances, including artistic grates, andirons, fenders and wood mantels.

In another column of this issue J. J. Spilker, of No. 48 Central avenue, Cincinnati, illustrates and describes an adjustable joint cutter for which strong claims are made. It is said to be the most complete miter machine in use, and has already attained wide employment, no less than 2000 being in use by manufacturers of frames, cabinet-work, sash, &c., in different parts of the country. An illustrated catalogue including this and other specialties manufactured by Mr. Spilker is supplied to any address.

The Scribner Roofing and Cornice Co., St., Paul, Minn., by an amendment to their charter, changed their name the first of the year to the Scribner-Libbey Co. Their business remains the same as heretefore and the *personnel* of the company is unaltered. They give special attention to galvanized-iron work, including corrugated iron and skylights, also to various forms of roofing, and have a department devoted to millwrighting machine work, &c.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

VOLUME VIII. NEW YORK, APRIL, 1886. NUMBER 4

## NOTES AND COMMENTS.

THE succession of strikes which the daily papers have reported the last few months has given wide interest to what is familiarly known as the labor problem. Labor for the first time in the history of this nation is assuming an organized form, and, by virtue of its organization, is in position to enforce demands as never before. Up to date moderation and justice have characterized the position of the various trades, and, accordingly, in almost all instances the sympathy of the public has been with the strikers. From the fact, however, that such movements are very frequently overdone, and because hot-headed, unbalanced men occasionally obtain control, the future is not without its danger. Should blunders be made, or should demands go too far, the mistake would react upon the heads of the laboring men of the country to even a greater extent than it would injure employers.

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IN this connection it may be of interest to review the actual condition of the country at the present time, so far as strikes are concerned. A few weeks since our enterprising business contemporary, *Bradstreet's*, through its vast corps of agents and representatives, collected and summarized the facts in this matter from all parts of the country. The situation at that date, March 10, was stated as follows: "There are no serious troubles anywhere in the South, east of the Mississippi, or in the Northwest. In the bituminous-coal regions of Pennsylvania, Maryland, Ohio and elsewhere there is a strike of unexampled proportions, involving 21,480 men; in the textile, boot and shoe and metal industries of New England 9960 employees have struck; in the strike on the Texas Pacific and the Gould Southwestern railways, and the allied difficulties in Texas cities, not less than 9000 men are involved; and in the great nail strike west of the Alleghanies, about 4000 men. As compared with a year and a quarter ago, when *Bradstreet's* made a similar review of the field, there are nearly as many boot and shoe employees on strike, more than twice as many textile-workers, nearly three times as many miners, and in all at least 51,000 men in various branches of industry, against only 18,000 in December, 1884. At the latter date almost all the strikes were against a reduction of wages, while now they are generally for an increase of wages, often in connection with efforts to secure a recognition by employers of employees' organizations, and compliance with their demands in other matters than wages. On the other hand fewer active boycotts are now being waged than were reported three months ago, when *Bradstreet's* made an exhaustive study of this phase of the labor question."

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IN view of the strikes which have occurred and the agitation of the eight-hour movement which is prominent in several important centers, many are anxiously inquiring what will be the effect on the year's building trade. If one starts out to obtain opinions upon this question he will find no difficulty in meeting croakers who affect to believe that the present attitude of labor is such as will blight the year's business. Many will refer circumstantially to large building operations which have been suspended or even abandoned because of the greater cost on account of the increase in rates of wages. The situation, however, is not quite so bad as this. Manufacturers, builders and employers generally are more ready to meet labor half-way at the present time than ever before. Capital is not frightened; on the contrary, it is seeking employment with an earnestness that has not been recently displayed in the history of our country. There is an abundance of money, and the industries of the country generally are in a healthy condition. The reasonable demands of the workingmen are recognized as just, and business, in the main, is going on regardless of them. This said, however, it remains that, were the labor organizations to deviate from the wise course which they seem to be at present pursuing, disaster would result and the building operations of the year, which at present promise to be unprecedentedly large, would be greatly curtailed.

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A SIGNIFICANT fact, and one that has an important bearing in the general consideration of this topic, is that at the recent session of the General Executive Committee of the Knights of Labor over 300 disputes and threatened strikes were disposed of amicably. If this good work continues it will be a comparatively short time before the equalizing process will be completed and harmony take the place of the widespread disagreement which apparently at present exists. Some of our exchanges report great activity among the architects. Our own observations confirm these reports. Many architects are exceptionally busy, and builders in many sections are vigorously preparing to crowd their present engagements, anticipating a renewal of midsummer contracts. There is exceptional activity in the smaller towns and villages throughout the country. Towns of 2000 to 5000 inhabitants are stimulated with the spirit of progress. Manufacturing is becoming largely extended, all of which has an important influence upon the building business. The year promises at this writing, in spite of labor difficulties, to be one of great prosperity for the building trades.

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WE have received a very interesting letter from P. J. McGuire, Cleveland, Ohio, general secretary of the Brotherhood of Carpenters and Joiners of America, and editor of *The Carpenter*, which is the monthly organ of the society mentioned. In this letter Mr. McGuire defines some of the objects of the organization and the position of the brotherhood with reference to some of the mooted labor questions which are at present attracting public attention. We understand that the Brotherhood of Carpenters and Joiners as a body is not connected with, nor has it any affiliation with, the Knights of Labor. Individual members of the brotherhood in some instances are members of the Knights of Labor, the same as some are members of the Masons, Odd Fellows and like orders. The position of the brotherhood in regard to strikes is also defined. While recognizing the right to strike, the admonition from the officers and leaders is to avoid strikes wherever possible. The object seems to be a union for the purpose of securing strength and co-operative action. As an organization, we are informed the brotherhood is opposed to the boycott where its use can be avoided. It condemns the frivolous and careless use of the boycott as a remedy for every imaginary wrong. It is said that an appeal to the boycott is taken only after all other efforts to secure arbitration of differences have failed. In addition, its objects are declared to be to assist members in obtaining employment, to furnish aid in case of death or disability, to cultivate a feeling of friendship among the craft, and to elevate the moral, intellectual and social condition of journeymen carpenters.

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SOME of the French papers have recently been giving attention to features of wood-working machines. Among other tools that have been discussed there may be mentioned the band-saw, which is rated as one of the most useful of machine tools. One of our contemporaries points out that the tendency of band-saws to break has made this tool of less service than it would be with this difficulty removed. It is then pointed out that the disposition of band-saws to break may be modified, if not entirely overcome, by employing very light wheels made with wire spokes, like those of bicycles. The common cause of the breaking of a saw-blade is the sudden checking of its movement by a knot in the wood or the wedging of a chip or sawdust in the cut. When this happens the lower pulley is held back by the dragging of the saw, and turns more slowly, while the momentum of the upper one throws it over at the usual speed, and the saw is thus tightly strained on the side furthest from the cut, and slackened and violently agitated on the working side. The shaking caused in this way frequently snaps the steel blade, and everything that diminishes the *vis viva* of the pulleys helps to assimilate their movement to that of the saw, and lessen the chances of shaking and snapping by unequal strains. By using wire spokes a strong pulley, 2 feet in diameter, can be made with a weight of a little over 12 pounds, and a 3-foot pulley can be made with something more than 20 pounds of metal. On these pulleys a sawmill will run a long time without danger of breaking. Another improvement noticed is a modification in grindstones and emery-wheels, by which the wheel is given a reciprocating lateral motion in addition to its rotation. Every one has noticed the advantage of moving a tool from side to side on a hand grindstone, so as to equalize the attrition on the different parts of the edge; and it is

found that by making the grindstones move, and keeping the tool still, a more perfect result is obtained, while the detached particles of steel have an opportunity to drop off the grindstone, instead of being crushed into it, and the wear of the stone and the heating of the tool are both greatly diminished.

THE common conception of invention is that it is a happy hit or discovery, the result of inspiration, a fortunate stroke of genius which occurs once in a lifetime. Very few outside of those who have devoted special study to the question realize that there are professional inventors—men who are regularly engaged in devising new ways and means, and who are as successful in their calling as other men are in other walks of life. One of our exchanges which is devoted to mechanical engineering discussed this subject a short time since, and what was said on that occasion is of interest to our readers: What is invention is an inquiry of interest not only to recognized inventors, but in even greater measure to a far larger class. Next to the ability to invent, many persons will profit almost equally by gaining knowledge as to what invention is, and when it is time to stop trying. It is always of advantage to turn a debatable border line into one which is well and plainly marked. In these days of method and system, the surveyor's chain is an emblem which should hold a higher place. Of course there are men to whose inventive genius metes and bounds are not to be lightly set. But it has been by no means proven that even such men work in a way essentially different in principle from that practiced by their less conspicuous fellows. And, however that may be, it is none the less doubtful whether the sum of modern progress is due as much to the labor of such exceptional inventors as to the swarm of patient workers, the results of whose efforts, taken singly, seem to be of almost trifling importance. The invention of printing may date from Gutenberg and the fifteenth century, but the mechanical development that has since taken place in types, presses, fixtures, accessories and methods is by comparison enormous, due as it is to the efforts of almost countless workers. The steam engine is another conspicuous instance, showing the same tendencies and effects.

THE dictionary meanings of the words "invent" and "invention" doubtless took their rise generations ago, when their present acceptation was in some degree the true one. "To find," to "discover," "to hit upon," are, however, definitions that by no means fully characterize the attempt of the real inventor at the present day, unless in a very exceptional degree. The great bulk of our modern industrial and scientific progress is not due to lucky accident, to hitting upon things, to discoveries which had not been previously led up to in a hundred minor, and often apparently insignificant, ways. On the contrary, it is plainly due to a recognition of the fact that, in the main, "invention" and "suggestion" should almost be regarded as synonymous terms. The man who starts out by forming or announcing an intention to invent something out of hand can safely be disregarded as an immediate factor in the total of industrial progress. Nine-tenths of modern invention comes from the systematic study of that which seems already well known. The slow process by which suggestion indicates new uses and appliances is the surest foundation upon which the inventor can hope to build. The man who feels himself ill-adapted to achieving success in this way, or unwilling to accept the restraints and requirements called for by the nature of the case, has little practical fitness for the inventor's calling. There is little room for doubt that to disregard of conditions of this kind, often perhaps based upon misapprehension merely, are due a large part of the failures and misfortunes that so thickly strew the pathway of invention.

WOODEN turbines have of late been proposed to meet the demand for an efficient and cheap water motor for small powers, and there is every reason to believe that within certain limits they will meet with a very favorable reception. Turbines, it must be remembered, have the advantage of being small in bulk for their power, and equally efficient for the highest and the lowest falls, and were it not for the fact that they are constructed wholly of metal their use would probably have long since become more general. Wooden wheels can in some cases be readily procured at a comparatively low price, and, as the question of first cost and ease of repairs enters very largely into the problem of successfully utilizing small water-powers for some purposes, and is of greater importance than a high efficiency, turbines have often been unable to compete with wheels of other types. This state of things, it is thought, can be changed by using wood as the structural material, thus securing the advantages of turbines without their drawbacks, and it has been found that in this way their cost can be reduced to about one-fourth of that of iron turbines. In some parts of Europe wheels of this class have been constructed partly of oak and partly of yew, and the results are understood to have been highly satisfactory in every respect.

THOSE of our readers who are interested in industrial education will enjoy an account of the Massachusetts Institute of Technology, which was published with illustrations in the Boston *Herald* of Wednesday, March 10. The article is in part historical, and contains a definite statement of the aims and purposes of the institution and its methods of imparting a modern liberal education. Illustrations of two of the buildings, portraits of its three presidents and also of the senior professor are presented. With reference to the School of Mechanical Arts the account contains the following: "The school of mechanic arts owes its existence to the efforts of President Runkle, and is a realization of the method of combining handwork with school instruction, which originated in the Government schools of Russia. In the workshops the boys are taught to handle tools and to work in iron and wood in the way of forging, filing, turning and so on, while in a school established for their instruction they are receiving the elements of a good education in mathematics, drawing and modern subjects. The peculiarity of the system is that in the shops there is no attempt to produce finished articles for the market. The whole effort is directed toward training the hand and eye of the pupil. The bit of iron or bit of wood remains the bit of iron or bit of wood—work upon it is solely directed toward giving the pupil skill in its manipulation. The error is thus completely avoided, it is claimed, of sacrificing the pupil to the product. The boy trained in these shops has acquired at the end of a systematic course of this sort a far greater amount of skill than could have been obtained under the old apprenticeship system, while he has been made so familiar with every variety of mechanical appliance that he is ready to take his place at once as a skilled workmen in a manufactory or machine shop, to learn the special processes of the particular manufacture."

THE convenience of electric signals in public and private buildings is very generally recognized. Speaking-tubes are also found desirable of employment, although the electric signal to a certain extent has superseded the latter. In some instances they are combined. Speaking tubes are very commonly employed in manufacturing establishments for communication between different parts, and in like manner electric signals are occasionally used. It has remained for a concern in the Northwest to make a novel application of the signal system. According to an account recently made public, the North Star Iron Works, of Minneapolis, have introduced a system of electric signals in connection with its toolroom which promises to prove as advantageous as it is novel. It is labor-saving in its object, and consists of a system of electric annunciators connecting the bench of each workman with the toolroom. Each bench is numbered, and the number of his bench is given to the workman. By pressing the button on any bench its number is announced to the attendant at the toolroom, who immediately sends a boy to find out what tool or tools are wanted, and the mechanic is supplied with the same without leaving his work. The advantage of this system does not stop with the saving of time. Tools do not get lost, and the whereabouts of each tool is known, and the knowledge that any misuse can be traced to the one so misusing it serves to keep the tool in better order. It may also be added that a good deal of confusion is thus avoided. A complete system of speaking-tubes connecting the various parts of the works with each other and with the office has also been put in these works with very satisfactory results.

## THE PLATES.

We present to our readers this month another study submitted in the Seventeenth Competition. The *nom de plume* of the author is "South." Evidently his idea in this study has been to present a house adapted for erection in the southern portion of the country. The perspective view which is found on Plate XIII shows the general appearance of the building, while the elevations on Plates XIV and XV show its features more in detail. The floor plans indicate an arrangement made necessary by the peculiarities of the climate in which it is designed to erect the house. On pages 68 to 70 will be found details of the work, all of which will be appreciated by our readers. More extended comment on this design, considering the fact that a decision in the Seventeenth Competition has not yet been reached, would be inappropriate at this time.

On Plate XVI we present a perspective view of a house built to the plans sent us a short time since by Mr. C. L. Graham, Burlington, Wis., and which were published on page 52 of our issue for March. We mentioned at the time that these plans had a number of desirable features about them, and regretted that we were unable to show the design of the structure. This Mr. Graham has since supplied us by a photograph, from which the engraving was made.

The two cottages shown on Plate XVI, drawn by Arthur L. Valk, whose office is in the Tribune Building, New York City, are of buildings that have already been erected. One of them is the residence of Mr. Dale, at Orange, N. J., and the other of Mr. Merritt, Port Chester, N. Y.

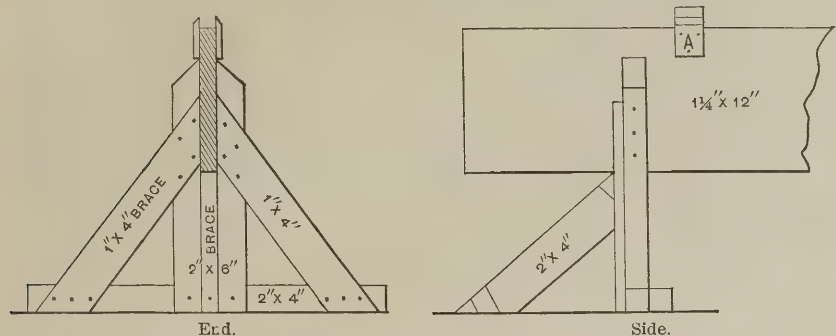
Some of the newspapers delight in poking fun at the vagaries of modern building construction. A Boston paper, for example, says: "Architecture is called 'Frozen Music,' but some of its notes look as if the orchestra had been struck with a heavy frost when they were tuning their instruments.

## Boat-Building for Amateurs.

BY H. L. CAMPBELL.

(Continued from page 50, March issue.)

The amateur should, if possible, select a straight, level floor to commence operations on, as it will be of great assistance in transferring measurements from one part of the boat to another, forming a permanent base line. Having selected a place to begin operations, a building plank must be set up. This is a plank the length of the boat and from 8 to 12 inches in width. It should be the exact thickness of the keel, but may be thicker, the upper part of the plank being planed down on each side to the required thickness. Set the plank upon three or four standards, firmly braced endwise and sidewise (see Fig. 10), the top of the plank being about 2 feet from the floor. Small clips, A, should be nailed on each side at intervals of about 3 feet, to hold the keel in position sidewise. They need not be more than ⅜ inch thick. The next step will be to get out the stems, keel and keelson and get them in position. The stems must be got out 1⅛ inches thick when finished. If possible they should be a natural crook of hackmatack (the aboriginal name for tamarack), but, as these crooks are somewhat difficult to procure in some sections of the country, we will make our details for straight-grained white oak, which is the next best thing obtainable, the deficiency of the natural crook being supplied by two pieces, the stem proper and its supporting piece, called the "deadwood" (see Fig. 11). The stem and deadwood must be riveted solidly together, the rivets being ¼ inch round iron, cut off to the proper length and driven through the stem into the deadwood. The hole being only $\frac{3}{16}$ inch, and a slight head being upset on the rod while driving, makes the rivet hold the stem firmly. Burrs are put over the ends of the rod on the deadwood, and a head riveted on; the face of the stem having to be bearded down to about ⅜ inch in thickness will not allow a burr and head to be riveted on the outer end of the rod. In riveting the deadwood to the keel a head is riveted on both ends of the rod, the burr and head being sunk flush with the surface of the keel.




End. Side.

*Boat-Building for Amateurs.—Fig.* 10.—*Construction of the Stocks.—Scale, ¾ Inch to the Foot.*

After the stem and deadwood are fastened together the rabbet may be cut in on each side, as shown in Fig. 11; it must be cut deep enough to receive the ends of the planks, ⅜ inch thick; and the fore side of the rabbet, against which the ends of the planks abut, must be worked to a smooth, straight line with a sharp chisel. A great deal of time and care should be expended on this part of the work, as it is in a very conspicuous place, and if badly done it will be impossible to make a creditable job in fitting the planks. The fore side or short bevel of the rabbet should be at an angle of about 45° to the face of the stem, and should continue at this angle down to the keel; from this point it gradually assumes a vertical position, as it approaches the midship section, where it has died away entirely, leaving the keel perfectly straight vertically. It will be noticed in Fig. 11 that after the fore side of the rabbet leaves the deadwood it is continued entirely on the keel, while the after side or long bevel continues on the keelson. The after bevel of the rabbet becomes longer from the top of the stem toward the deadwood, and then shorter after it leaves the deadwood, and continues along the keelson till it reaches the midship section. The bevel of the keelson and deadwood at each station is taken from the lines on the body plan, less the thickness of the planking, as all the lines on each plan are drawn to the outside of the planking. The keelson is made of ⅞ inch oak, 3 inches wide at the center, and diminished toward each end, with a curved taper to the width of the deadwood.

The keelson must be screwed to the keel at intervals of about 6 or 8 inches, the screws being put in on each side of the center, the reason for which will be explained hereafter. The keel may be got out 1⅛ inches thick and 1⅞ inches deep at the center, diminishing in depth gradually to 1⅜ inches at each end; this leaves it 1 inch at each end and 1½ inches deep at the center when the planks are on. The timber for the keel should be selected so that the grain points aft. If this is not done the water will raise the grain and make the whole surface rough After the stems and deadwoods have been riveted to the keel they may be tapered from the rabbet toward the front of the stem to about ⅜ inch in thickness, care being taken not to cut into the rivet-holes on the stem. The top part of the stem may be left thicker, the thinnest edge being at the water line. In cutting the after bevel of the rabbet on the stem, deadwood and keelson, care must be taken not to cut away too much. Although the lines in the body plan show the bevels, it is better to be on the safe side and take off some with a chisel when fitting the planks, as each plank will show exactly how much must be taken off to give it a solid bearing.

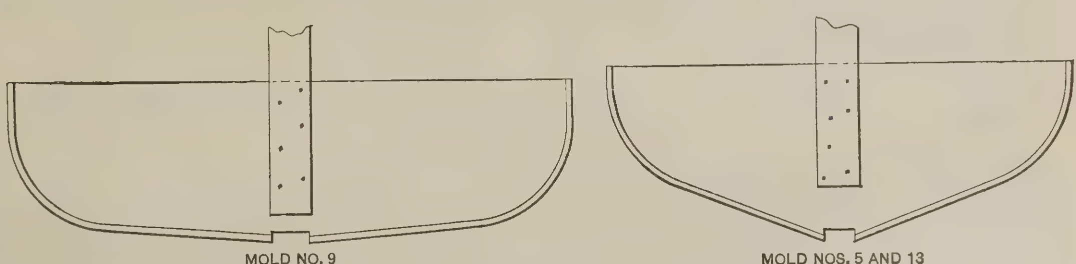



*Fig.* 12.—*Midship and Quarter-Molds.—Scale, ¾ Inch to the Foot.*

The keel and stems are now ready to set up on the building plank. The top of the plank must be hollowed out to fit the rocker of the keel, 1½ inches at center, and curving gradually to nothing at each end. A piece of 3 x 4 must then be fastened to the ceiling above the building plank, nearly the same length, and directly in line over it. The keel with the stems attached may now be placed in position, and shores cut in between the piece on the ceiling and keelson, and driven tightly home. These shores must be placed at about stations 2, 6, 12 and 16; before tacking these permanently, the keel must be perfectly straight from end to end. The stems must now be made perfectly plumb, and two side braces carried from each stem to the ceiling. The joints between stem, deadwood and keel should be put together with white lead, and stop-waters must be put in the rabbet where it crosses the joint between deadwood and stem, and also on the joint between deadwood and keel. After the three are fastened together bore through the intersection of the angle of the rabbet with the joint with a ½-inch bit, and drive in a pine plug moderately tight. This is worked out to the shape of the rabbet and is entirely concealed by the planking. It prevents the water from soaking along the joints to the interior of the boat. We are now ready to make and place the molds in position; three of these are necessary, and they will be placed on stations 5, 9 and 13. These are simply solid patterns made of ⅞-inch pine lumber, around which the planks are bent into position. No. 9 is made identical with the midship section, and Nos. 5 and

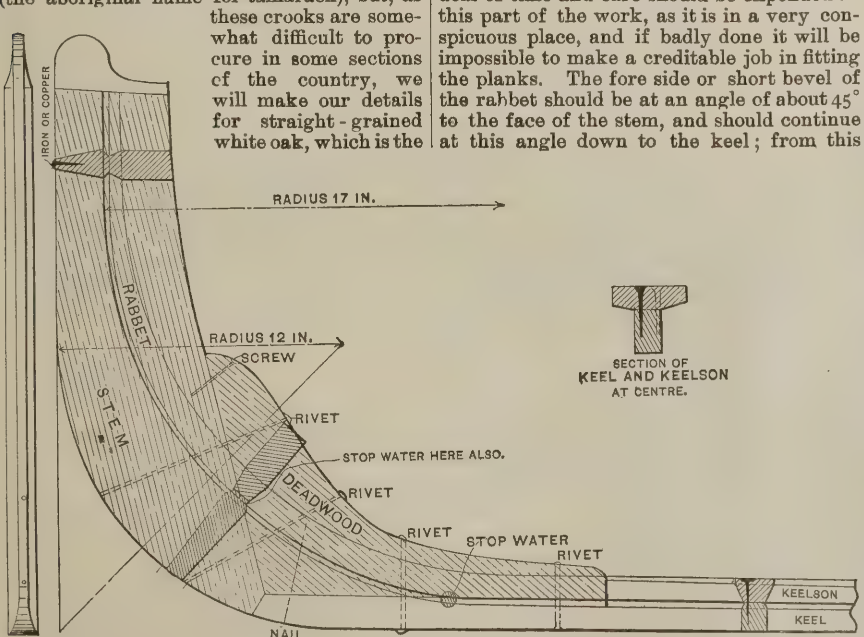
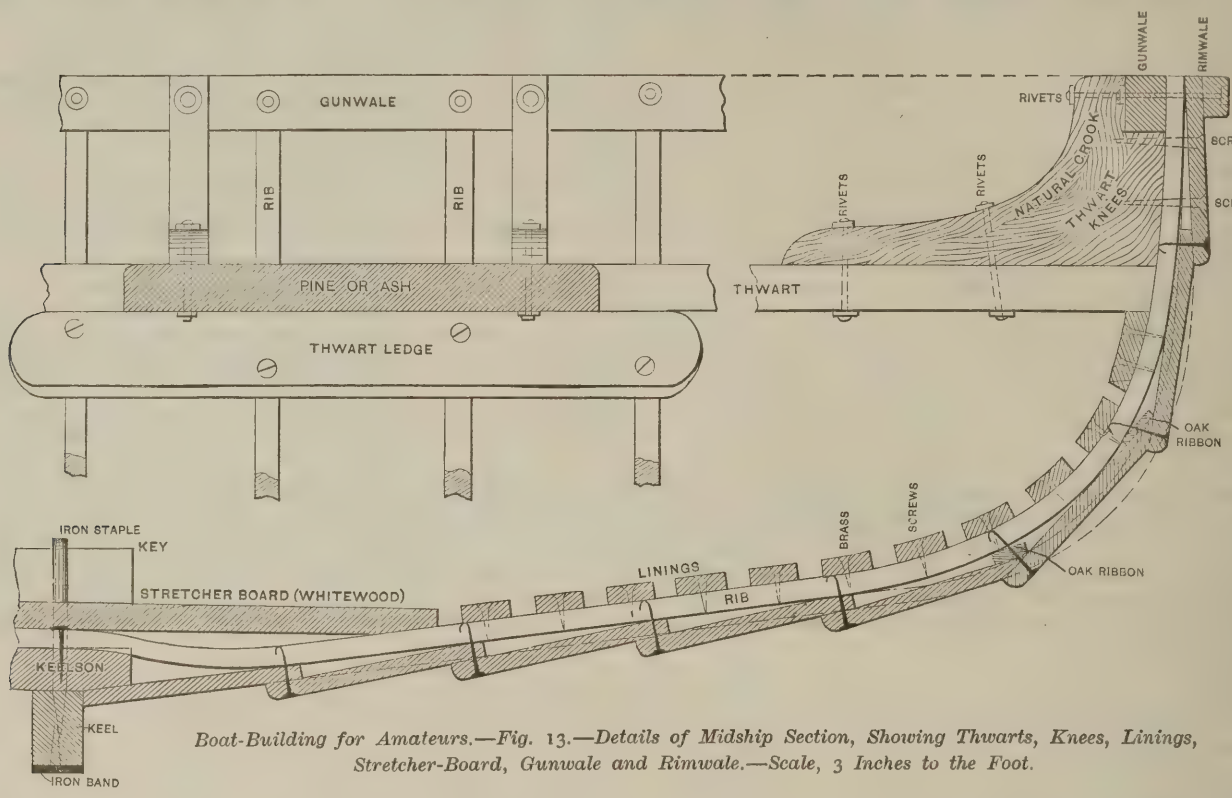



*Fig.* 11.—*Details of Stems, Keel and Keelson.—Scale, 1½ Inches to the Foot.*

13 correspond with line No. 5 on the body plan. Both sides of the molds must be exactly alike, as each plank on the boat is exactly the same as the corresponding one on the other side, and discrepancy in the molds would throw the planks out of position. After the molds are laid out according to the lines on the body plan, the thickness of the planks must be taken off all around. They must then be notched down on the keelson till the continued line of the floor intersects the joint between keelson and keel. Mold No. 9 may be left square-edged, but molds Nos. 5 and 13 must be beveled on the edge, and the standing edge placed directly on the line. A shore must now be cut in between the ceiling and keelson at each mold, and the mold firmly nailed to it. The mold must then be adjusted at right angles to the line of the keel, made perfectly level on top, and the shores secured permanently at the ceiling.




*Boat-Building for Amateurs.—Fig. 13.—Details of Midship Section, Showing Thwarts, Knees, Linings, Stretcher-Board, Gunwale and Rimwale.—Scale, 3 Inches to the Foot.*

We are now ready to commence planking. It is generally conceded that while cedar is the best wood that can be used for planking small boats, both as regards weight and durability, it is rather difficult to get in some sections of the country, and if procured in any of the large cities it is apt to be expensive. The next best wood is white pine. It weighs only 3 pounds per cubic foot more than cedar, is easily worked, and with ordinary care a pine boat will last just about as long as a cedar one. The timber for the planks should be selected from clear ⅞-inch thick dressed stock lumber, only those boards being selected that are sawn from the center of the log or not far from it. They should also be straight of grain, free from knots, sap and shake, and quite soft and free-working. The boards must then be resawed and planed down to ⅜ inch thickness. The next step will be to divide the midship section into eight equal parts; the number of strakes there will be on each side. This can be done with a pair of compasses, commencing at the keel and stepping along the periphery of the mold to the deck line. These divisions must be plainly marked on the side of the mold, on both sides of the boat. The quarter-molds, or molds 5 and 13, must be divided in the same manner into the same number of parts. We now measure the hight from where the rabbet joins the keel to the top of the rabbet on the stem, using a stick for a measure and the floor for a base line. Dividing the distance on the stick into eight equal parts and using the floor as a base line, we mark each division on the rabbet on each side of each stem. We now have the width of each strake marked on each mold and on the stems, and may commence to put on the first or garboard strakes. A plank 18 feet long and 6 inches wide will be large enough for these. The amateur will find this to be the most difficult strake to put on in the whole boat, as the entire bottom edge and each end must be fitted perfectly. In putting the strakes on the boat the same precaution must be observed as with the keel. If any grain runs out on the surface it must be pointed aft. Place the garboard in position against the keel at the midship section, and have some small shores long enough to reach from the keelson to the floor; put one of these under the midship mold, pressing the plank firmly up against the mold and keelson.

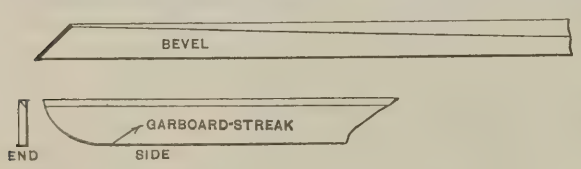



*Fig. 14.—Top View (Half Size) and Side (Scale, ¾ Inch to the Foot) of Garboard Strake.*

It will be found that the strake will only touch the keel at the midship mold, leaving it as it runs to each end. This distance must be equally divided on the quarter-molds, and the strake shored up tightly to each mold. The ends of the strake must now be clamped to the stems, a pair of iron screw-clamps being necessary for this purpose. Great care must be exercised in clamping all the strakes to the stems; if the strake is raised up too high on the stem it will make the curve too full between the quarter-mold and the stem, and if pushed down too far it will make the curve too straight; it requires a little judgment to set the strake in the proper position on the stem, and if the amateur has any doubts on the subject he had better make another pair or two of molds, and place them about where the rabbet joins the keel. The compasses must be set at this distance, and, commencing at the point where the edge of the strake crosses the rabbet on the stem, set one leg of the compasses on the outer edge of the rabbet, and keeping the upper leg vertically over the lower one make a prick-mark on the strake; do the same about every ½ inch along the curve of the rabbet to where it dies in the keel, when the prick-marks may be made further apart, always keeping the legs of the compasses parallel with the vertical lines of the molds.

After the strake has been pricked from end to end it may be taken down and a line drawn through the prick-marks, and the strake worked down to the line, giving the edge and ends the proper bevel to fit the rabbet. Never cut away the wood behind to make a tight joint in front. It may do in house-joiner work, but in boatwork it is a delusion and a snare. If you cannot make a tight-fitting joint all through, leave it open in front, so that it can be filled with cotton. If the prick-marks have been carefully made the plank should fit along its entire length. It is better to fit the forward end of every plank first, and do it good, and trust to luck to get a good fit on the after end without getting the strake too short. It must be remembered that the bow of a boat is being continually forced through the water, and a defective joint there will admit a great deal more water than a similar one at the stern. When the bottom part of the strake has been fitted we give it the proper shape on top by getting the width of the divisions previously laid out on the molds and stems,

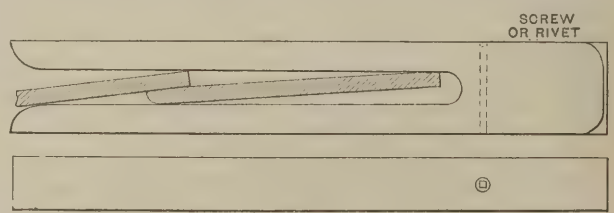



*Fig. 15.—Clamp for Holding Strakes in Position.—Scale, 3 Inches to the Foot.*

and adding ¾ inch for the lap. We now trace a line through the points thus marked and work our plank down to it. It will be found that the strake will be nearly straight for quite a distance on each side of the midship section, and will then curve rapidly to the end; all these curves should be fair; all short kinks must be avoided. The strake should now be smoothed, planed and sandpapered on both sides and the ends beveled to receive the next strake. First run a pencil gauge line all along the top edge of the plank on the outside, ¾ inch from the edge; this will be the distance that the next strake will overlap. With a smooth plane commence about 2 feet from each end and plane a winding bevel, running out to about $\frac{1}{16}$ inch at the end, and taking care not to go below the gauge line. (See Fig. 14.) The garboard strake is now ready to be put in place. Before putting on the one we have fitted in place we lay it face down on the plank intended for the other side, and mark it off. If our molds and the rest of our work are correct the same pattern should exactly fit on each side. The next subject to be considered is that of nails. If the boat is to be used in salt water all the fastenings should be of brass and copper, as iron will corrode very rapidly in that element. If the boat is to be finished in its natural color the same fastenings must be used, as iron will discolor the wood if not painted. If for use in fresh water, and the boat painted inside and out, iron fastenings are the best that can be used, as they oxidize slightly in the wood and hold more firmly than copper. Tinned nails will not corrode in fresh water, and will last some time in salt, but they hold very poorly—in fact, they seem to be lubricated in some way, and are greasy to the touch; they will hold nothing if not clinched, and are not to be recommended. We would advise the amateur to build his first boat with a view to painting it when finished, as paint, like charity, will cover a multitude of omissions, and will make a boat tight that would otherwise leak like a sieve.

*Fig. 16.—Hood Boards (Half Size.)*

*Fig. 17.—Diagram of Splice.—Scale, 3 Inches to the Foot.*

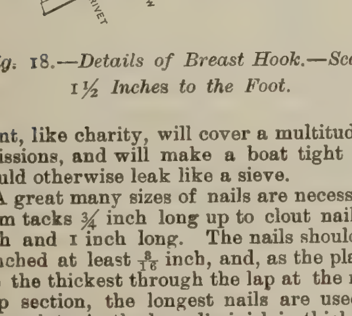



*Fig. 18.—Details of Breast Hook.—Scale, 1½ Inches to the Foot.*

A great many sizes of nails are necessary, from tacks ¾ inch long up to clout nails ⅞ inch and 1 inch long. The nails should be clinched at least $\frac{3}{16}$ inch, and, as the planks are the thickest through the lap at the midship section, the longest nails are used at that point. As the laps diminish in thickness toward each end the nails must diminish in length accordingly, and the smaller the nail the less must be allowed for clinching. The wide, flat-headed clout nail is the one that must be used. In driving the nails use a light, round-faced hammer and drive the nail with light, quick strokes. The clinching is done by holding the face of a heavy hammer or similar piece of steel against the inside of the plank and driving the nails against it. This causes the nail to turn over and clinch without coming through the wood and leaves it almost invisible on the inside; if the nails are too long, they will have a tendency to bend on the outside before clinching and when clinched will leave ugly scars in the plank. The outside plank must in all cases be bored with a brad-awl to receive the nails, the awl being slightly smaller than the nail. The ends of the planks, technically called the "hood ends," should be attached to the stems with screws Nos. 5 or 6, from ¾ inch to ⅞ inch long. The planks must be bored to prevent splitting, and the screws put in at least an inch from the end; about four screws to a plank are sufficient. Copper nails being softer than iron, they clinch more readily and longer ones can be used without danger of splitting. When both garboards are on, firmly nailed to keelson, the nails being 1 inch apart and screwed to deadwoods and stems, the ribs may be spaced off on the keelson 4 inches apart from stem to stern. For a short distance on each side of the midship section the keelson must be rounded as shown in Fig. 13, or gains cut in the corners of it, to allow the ribs to bend down to meet the first lap. As the floor rises toward each end this will not be necessary, the garboards showing when to stop.

The next step is to bevel the garboards along the upper edge to receive the next strake. This bevel is found by laying a straight piece of stick, say 6 inches long, against the mold, one end resting on the mold ¾ inch higher up than the division line, and the other end running down on the strake below. The strake must be beveled from the gauge line to the edge till the stick has a flat bearing the full width of the lap. This is done at each mold, the bevel being greater at the quarter-molds than at the center. The bevel can then be planed off between the mold by the eye, increasing it gradually from the center each way. The same thing can be done between the quarter-molds and the stem, joining the bevel already made at the stem. When finished it should be a gradual taper from the quarter-mold to the stem, and very smooth and even.

(To be continued.)

## Mechanical Aids to Decoration.

Under the above title Mr. A. Curtiss Bond in one of our exchanges presents a brief review of the mechanical means employed in the preparation for and finish of certain kinds of decorative work that is quite readable. He says:

Mechanism in decoration, by which color designs and forms may be indefinitely repeated or multipled, is always in course of progress; yet it here would seem, with all the varieties of adaptations which we witness, certain defined limits, and in numberless directions of decorative art handiwork, well asserts its superiority. Yet mechanical production itself bears the stamp of intelligent purpose and constructive ingenuity, it being, so to speak, a transfer of handwork, an intermediary between the designing brain and hand, shown in the pattern and the execution. The die of the mold for molten metal and plastic material has either itself to be worked out by hand, or, if obtained by impress of relief work, the relief model has to be carved. The production and duplication of much decorative work by mechanical means is recommended by economy, in some instances by greater uniformity; but in the higher spheres of decoration the absolute uniformity thus obtained falls far short in value of the direct work of the hand. This is evident in ornamenting in color walls and ceilings, if the execution be skillful, as compared with stenciling. The slight variations in the ornament—for the work of the hand never absolutely repeats itself—is itself a charm, as showing greater freedom of execution, and in some instances greater delicacy of touch. Nevertheless, decoration is greatly behooven to the mechanical arts for its diffusion, whether in furniture, structural surfaces or the ornaments by which interiors are adorned.

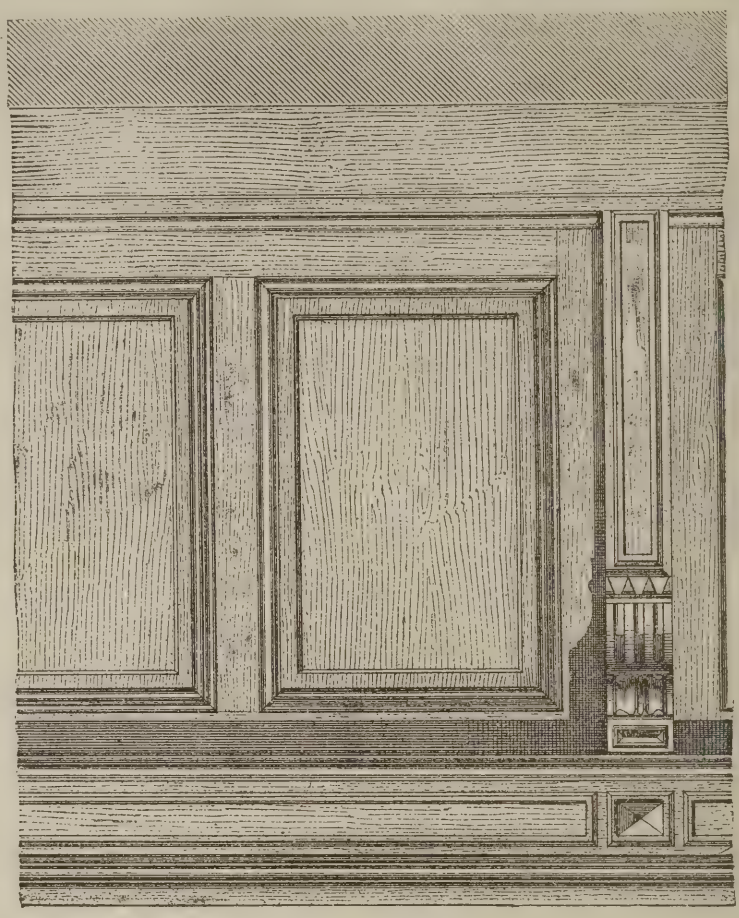
One of the greatest novelties promised in mechanical devices, as concerns painting, is a machine consisting of a hand piece, a compressed air chamber and an air pump, with communicating cup filled with liquid pigment, which enables the artist to throw out a spray which in the first instance forms a fine line, and in the second widens the line to the desired breadth. The skill required in the operation, the proportions to be given to the line, render the line, which may even be thus shaded at will, something more than mechanical work. Many devices for facilitating decorative work may be characterized as assistive. They are brought in co-operatively and are little more than the brush to the painter. The improvement in tools merits notice here. Take, for instance, the wedge-shaped brush, so useful for many purposes, previously to the manufacture of which decorative artisans had to wait the wearing down on one side of their flat brushes. Fortunes have been made by smaller devices than these, suggested primarily by individual requirements, and really foreshadowed by the efforts of artificers in their practices or methods to devise means for escaping inconveniences attached to their tools. The tools used for wood carving and adapted to special purposes and to different scales have been greatly increased in number of late years. There are mechanical devices which may be regarded as completing the operations of the hand, as when, previously to applying veneer, the ornament, adjusted to the pattern and already rubbed down with the veneering hammer and affixed by glue to paper, is placed between hot boards and pressed with hand-screws, which, when the glue is dry, allows the work to come out quite clear from the boards and appear as one piece of veneer, which is then ready for application.

The cowl with its screw clamps comes to the aid of the veneerer to secure a graduated pressure, commencing from the center of the pieces, being an exact counterpart of curved work, and, when flat, employed, like the veneering hammer, for plane surfaces. The heat of the cowl quickly penetrates the thin veneer, making the glue exceedingly fluid, and the pressure applied by the clamps soon expels the greater portion of it, and causes the veneer to bed very closely to the work. Wood-carvers, in copying models, are now supplied with a marking or cutting gauge of ingenious construction, by which, when once set to the required dimensions, they can not only give all their markings the relative width, but secure depth of the ground line of the carving and hight of relief portion, or rather the excess on their own panel, so as to enable them to cut away freely, instead of timorously dealing their strokes. The services of the lathe are particularly prominent in decorative woodwork, particularly in hand-turning. In hand-turning the tool is held by the hand, the changes of form made in the wood being dependent on the relative position or angle of the cutting edge. It is the work of an instant only to vary the relative hight and angle of a hand tool to the work, converting it from a roughing to a finishing tool, or even to a scraper, which operations are often impracticable with a tool held in a side rest. With the latter the guidance is solely by the eye; with the lathe the delicate sense of feeling is appealed to, so that any variations may be made with absolute accuracy.

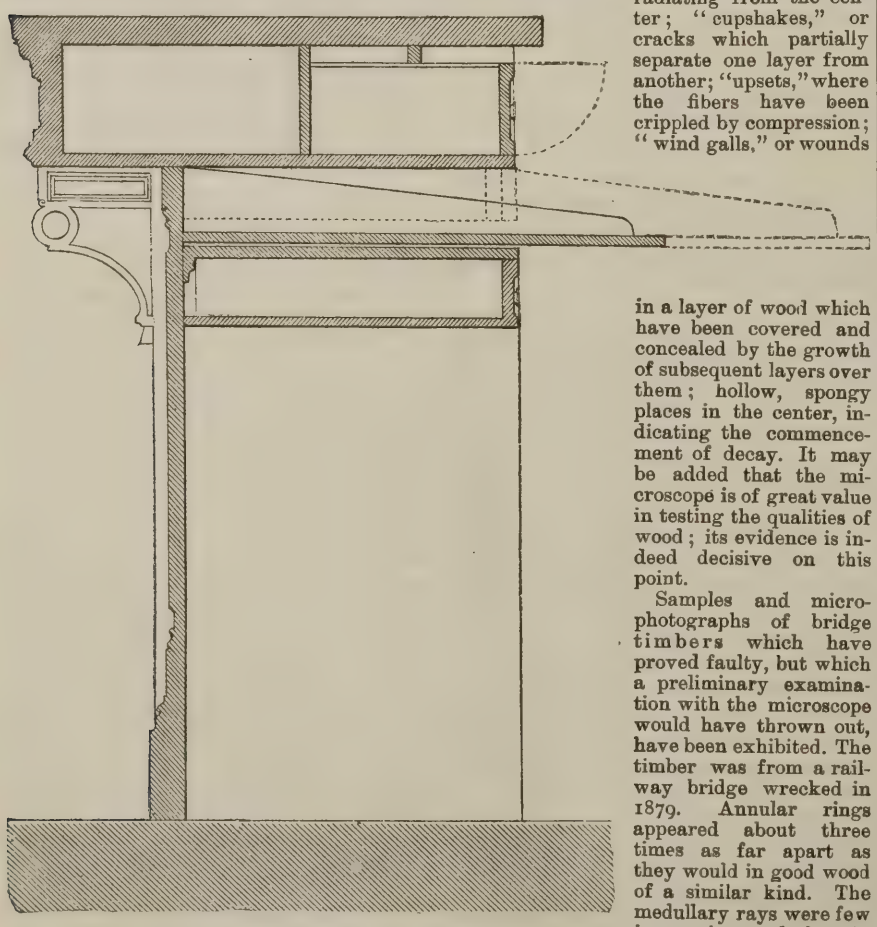
In the development of electricity as a motor, under the system of storage, much of the preparatory work of the molder, whether in wood or metals, will doubtlessly be greatly aided in the future. Scaffold brackets are among the ingenious contributions to the satisfactory execution of exterior house decorative work on walls. This work is necessarily done much better when the artisan has not to balance himself, but obtains a steady platform without unpleasant swaying. The ladder is made with large hooks at top to hang from window sills, and the platform, which is transferable to any of the runs, is fastened by curved hooks attached to an environing bar both to that rung and the rung above.

## Counter Details.

The accompanying cuts represent an elevation and vertical cross-section through a counter as employed in a Paris store. The cross-section shows the details of construction and also exhibits an arrangement of parts which may afford some useful hints to American designers. A narrow drawer or shelf is located under the counter at the back edge, the front of which is hinged in such a manner as to be raised, as indicated by the dotted lines. Immediately below this an extension shelf occurs which can be pulled out, as also indicated by the dotted lines, while the third section is a drawer arranged in the usual manner. The first division to which we have referred may be subdivided so as to constitute it an arrangement of pigeon-holes. The lid, which shuts down as we have described, thoroughly protects these from dust. A peculiarity of this lid is that it is arranged so as to slip in above a case, thus saving the necessity of hinges. The space allowed for this purpose is clearly shown in the engraving.



*Elevation of Counter.*



*Counter Details.—Transverse Section.*

## Characteristics of Good Wood.

A writer in the Ohio *Lumber Journal* gives some directions for selecting good wood:

There are certain appearances characteristic of good wood, to whatever class it belongs. In the same species of wood, that will in general be the strongest and most durable which has grown the slowest, as shown by the narrowness of the annular rings. The cellular tissue as seen in the medullary rays (when visible) should be hard and compact. The vascular or fibrous tissue should adhere firmly together, and should show no wooliness at a freshly-cut surface; nor should it clog the teeth of the saw with loose fibers. If the wood is colored, darkness of color is in general a sign of strength and durability. The freshly-cut surface should be firm and shining, and should have somewhat of a translucent appearance. In a wood of a given species the heaviest specimens are generally the stronger and more lasting. Among the resinous woods those having the least rosin in their pores, and among the non-resinous woods those having the least sap or gum in them, are generally the best. Timber should be free from such blemishes as "clefts," or cracks radiating from the center; "cupshakes," or cracks which partially separate one layer from another; "upsets," where the fibers have been crippled by compression; "wind galls," or wounds in a layer of wood which have been covered and concealed by the growth of subsequent layers over them; hollow, spongy places in the center, indicating the commencement of decay. It may be added that the microscope is of great value in testing the qualities of wood; its evidence is indeed decisive on this point.

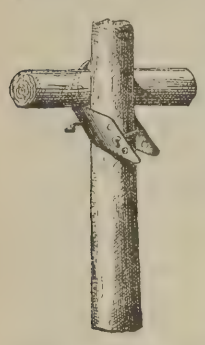
Samples and microphotographs of bridge timbers which have proved faulty, but which a preliminary examination with the microscope would have thrown out, have been exhibited. The timber was from a railway bridge wrecked in 1879. Annular rings appeared about three times as far apart as they would in good wood of a similar kind. The medullary rays were few in number and short in length, while in good wood they are of considerable length and so numerous that tangential sections present the appearance of a series of tubes seen endwise on a number of parallel chains. After once seeing and comparing samples of good wood it is easy to recognize the difference with a pocket magnifying glass. The trunks and limbs of exogenous trees, as is well known, are built up of concentric rings or layers of woody fibers, which are held together by radial plates, acting like treenails in a boat's side. The rings, representing successive years' growth, are composed of tubes the interstices of which are filled with cellulose. The slower the growth of the tree the thinner these yearly rings, and the denser and harder the wood, other things being equal. Not only is the closeness of the texture an indication of the hardness and strength of the timber, but the size, frequency and distribution of the radial plates which bind the annual layers together may be taken as a sign of the character of the wood and its ability to resist strains, especially a breaking stress. In the strong kinds the concentric layers are close in texture and narrow in width, and the radial plates numerous, wide, long and stout; while in poor stuff the opposite characteristics prevail. The practical application consists in having such enlarged photographic sections, longitudinal and transverse, of standard pieces of timber bearing a certain known maximum or minimum strain, and rejecting any piece which the assisted eye detects to have fewer rings per inch of diameter, fewer fibers or fewer radial plates per square inch of section, or to use such pieces with a greater factor of safety. The advantage of the method is that it allows all timber for important positions to be tested before being used.

A building was in progress of erection opposite a public building in Washington City. One of the clerks who had been looking out of the window for some time said to another clerk who was reading a newspaper: "I have been watching that workman over there for half an hour, and he has not done a lick of work in all that time. I wonder what he gets paid for?" Just about the same time the workman remarked to a fellow-workman: "Just look at that Government clerk over there. He hasn't done any-

thing except look out of the window for the last half-hour. No wonder the country is going to the dogs."

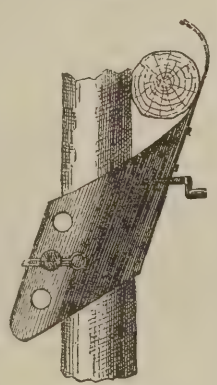
## Fastening Scaffolds.

A common construction of scaffolding erected about buildings during the time of their construction employs upright poles, put in place either by setting them in the ground or by anchoring them in barrels or boxes of sand. Horizontal poles are placed at the hight of each story and are arranged to receive the plank on which the workmen stand, and which in many cases sustain the weight of some of the materials employed. The common method of connecting the vertical and horizontal poles in use in New York and vicinity is a lashing of rope. Possibly the reason why rope is so extensively employed for this purpose about New York depends in some measure upon the presence of sailors and other workmen who are accustomed to such fastening. "Sail riggers," as they are frequently called, are sometimes employed in work of this sort. Many patent devices, more or less adjustable in character, have been put before the public for purposes of this nature, but none of them, we believe, have become sufficiently popular to supersede in any great measure the use of rope, to which we have alluded. The great objection to rope is that, when the vertical and horizontal pieces are joined together as solidly as possible, there is still an element of danger, especially when considerable weight is placed upon the scaffolding. A shearing strain is brought upon the ropes, which in some cases causes the destruction of the scaffold.



*Scaffold Support.—General View.*

The accompanying engraving from a French paper shows a device—of German origin, we believe—which is said to be extensively employed in uniting scaffolds in different parts of Europe. The engraving very clearly indicates the nature of the article. The length of the fastening is about 1 foot. It is claimed to unite the horizontal and vertical poles together as firmly as if clamping screws were used. The fastening consists of an iron collar made with a split edge, so that it may be slipped upon the vertical base. The opposite sides of the collar have holes in them through which can be introduced, according to the size of the pole, a pin which is fastened in place by means of a split key, clearly shown in the engraving. The upper part of the collar is inclined in such a manner that the horizontal pole can rest upon it as indicated. By its own weight it forces the lower edge of the collar against the side of the vertical post, thus acting on the principle of the wedge. The more weight there is upon the horizontal piece the greater the pressure upon the collar, forcing it against and into the side of the post in a way to obviate the chance of slipping. A small screw which is brought against the vertical post prevents the collar from falling down by its own weight in the absence of the horizontal timber. The device is simple, and, from the fact that it is in very general use in some parts of Europe, would seem to have some merit. It allows of the construction of a scaffolding with great rapidity and economy. The durability of such an article, as compared with that of rope, would seem to argue in favor of the iron fastening. Our foreign exchanges, speaking of this article, credit it with the important advantage of greater security than can be obtained by ropes under the most favorable circumstances.



*Side Elevation.*

## Enameled Brick.

We have at several times in the past received letters from our subscribers asking for information regarding enameled brick, not only with respect to the processes employed, but also with regard to the present source of supply, the durability and the relative cost. A number of facts which are partial answers to questions of this kind appeared in a letter published a short time since in the *Clay Worker*. The writer commences with the assertion that much has been said and written on the subject of enameling brick with reference to the expense of the work, the large percentage of loss and the quality of brick to be used in enameling. The object of his article was to set at rest several questions relating to the expense attendant upon engaging in this work. Omitting the introduction, the letter in question is as follows:

Nearly 20 years ago efforts were made in many parts of this country to successfully introduce an enameled brick that would take the place of painted brick in courts, and glazed tile for wainscoting in halls, and for ornamental fronts and trimmings. Owing to the expensive material used to make up the enamels, and the experience in setting and burning, the attempt to introduce this business in this country failed, as well as many of those who attempted to make it a success. For a number of years but little was heard of any attempt being made on the part of brick-makers to revive this work; still, many were spending large amounts of money in experiments, and pursuing a course that could have but one ending—failure; several of the more determined would-be enamelers sent to Germany and England for the English and German recipes, paying dearly for their whistle, for it is a well-known fact that an enamel adapted to one clay will not work on another. The successful introduction of the enameling of brick fell to the lot of or was brought about by parties in Philadelphia, Pa. At first it was up-hill work to introduce them, owing to a revival in memory of the attempt made some 12 or 15 years before to introduce enameling and the actual substitution of a cheap glazed brick to fill some orders that had been placed. The result of the substitution of a cheap glazed brick for enameled made itself known, for after the first winter's frost they opened up not unlike a chestnut burr, leaving the brick in about the same condition they were before they were glazed, and the purchaser in just the humor to advise others not to invest in them for ornamental purposes.

The first successful company to embark in this work were the Brick Enameling Co., of Philadelphia, Pa. They are now putting on the market an enameled brick that has no superior in this or any other country. Aside from this company there are but two others engaged in this work. The demand for enameled brick can not be accurately given, but architects in all the leading cities and towns say that if they could be had at a reasonable rate there would be no end to the demand. In this city alone the demand would warrant the erection of works expressly for this business, and the time is not far distant when it will be done. I have been asked a number of times to give the cost of engaging in the business, and for the benefit of your readers and those interested in this work I will give them here. In the first place it is necessary to have a kiln adapted to this work. It is better to have a muffle kiln, but in the absence of this a kiln can be erected with a capacity of from 6000 to 10,000 brick for about $600 to $800. Then comes next in order the saggers; these are made to hold five brick each. They are made of fire-clay, uniform in size, and burned hard, costing at the factory 16 cents each. Next we have the mill or pulverizer to grind the enamels in. This will not exceed $20. Indeed, any one can make a first-class one that will not exceed half that amount and be equally as good. Next in order we have the tubs, buckets and cups. These will cost for an establishment of this capacity about $50. Here we have an establishment all complete, except the building and enameler to do the work, for less than $2500. With a kiln of this capacity and the assistance of a man who understands burning, an enameler and two boys can produce on an average 40,000 enameled brick per month, with an average price of $60 per 1000. The cost of producing 1000 enameled brick, which includes the burning, enameling, enamelers' and helpers' wages, is from $12 to $15 per 1000. This also includes a kiln loss in burning of 2 per cent. Does it or will it pay to engage in this business?

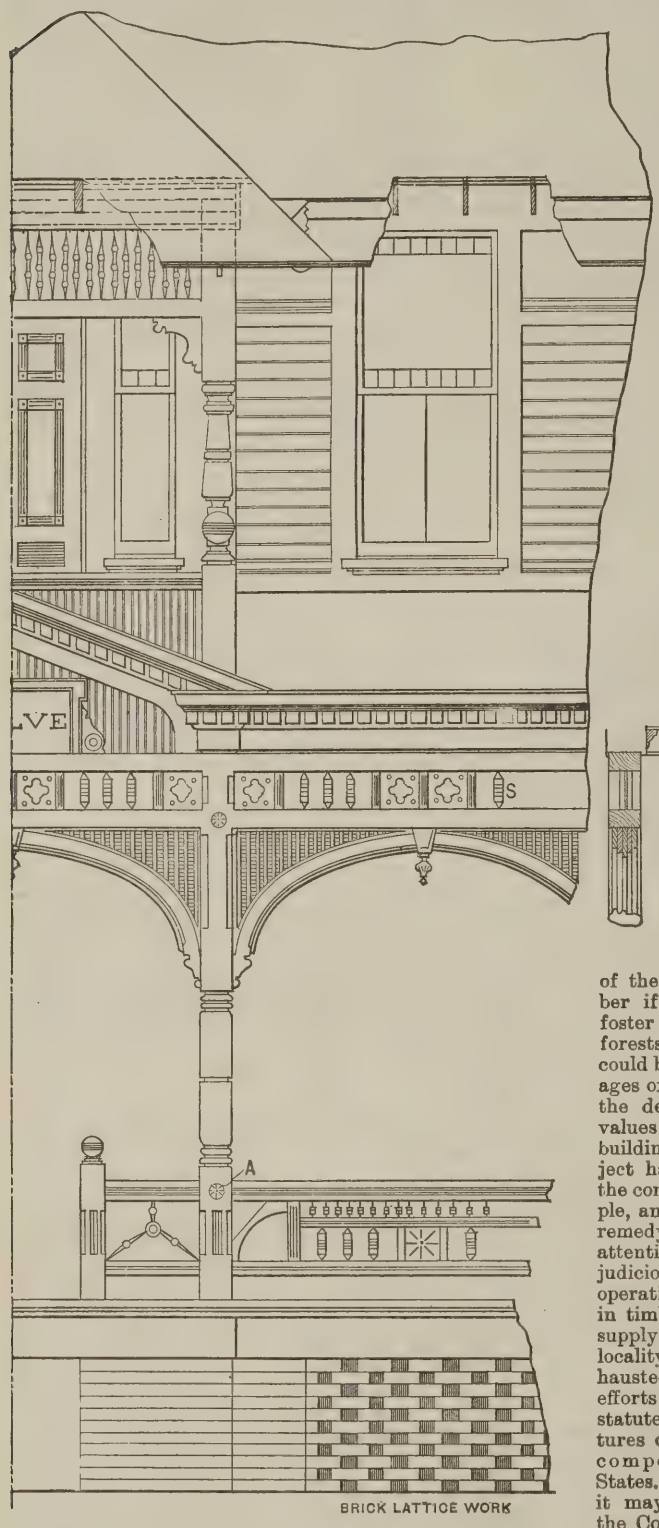
I think any reasonable person would be satisfied with this profit. Perhaps your reader will ask, If there is such a good margin in this business, why is it that there are so few engaged in it? For the simple reason that enamelers are scarce as honest politicians. It is no trouble to find plenty of men who profess, and call themselves enamelers, but a few well-directed questions will show them up. The best way to do this is to give them a small piece of brick, ask them to enamel it and return it to you. If they consent to do this, do not hesitate to let them. If they bring it back in a reasonable time and you are satisfied that it is your brick, then it is advisable to talk with them. If they understand enameling they will not hesitate to accept an offer to do this. On one piece of a brick they must not be expected to do as well as on a whole kiln when they have everything in good working order and things convenient to work with. The future of the enameled-brick business cannot even be guessed at; but one thing is certain—with more establishments to make them and firms to engage in the business and advance the uses that clay in different forms enameled can be used, the greater will be the demand and the larger the profit. It is not necessary to use the first quality of your pressed brick for enameling; all yards have those that have perfect edges, but are off-color; use these and realize more than double the profit on them enameled that you do on the first quality pressed.

## Relative Strength of Wet and Dry Timber.

In reply to a statement by the *American Miller*, that "wet timber is not as strong as dry, in some cases it has not half the strength of dry," a correspondent of that paper writes as follows: "In September, 1876, the Lanesboro Mills, Lanesboro, Minn., burned, and that fall we rebuilt them and began making flour the next March. We used sawed pine (taken out of the Mississippi River) for joists, 3 x 12 inches, 12 feet long, and sized them, laying them on top of the girders, to get their full strength, and then used ⅞-match flooring. The joists were placed 12 inches from center to center, leaving 9 inches between them. In the fall of 1877 we piled wheat on the floor 26 feet deep in the bins, and the joists, yet wet and green, only sagged a trifle, and carried the immense weight safely. Two years later the same joists were dry, from the heat of our very large stove. We loaded the floor with 24 feet of wheat, and six joists broke off nearly square in the middle, and others were cracked. In the first instance the bins held 360 tons of wheat while the joists under them were green. When the joists were dry 300 tons or less broke several of them. This shows that green pine is stronger than dry pine, as the wood becomes brash or brittle by drying, and is not as strong as when green. This is caused by the sap drying and leaving only solid matter in the capillary tubes, and they cannot move one on another, while if the timber is green the tubes are full of water, and can bend or move one on another. I know of but two kinds of wood that are stronger dry than green, and they are maple and white oak."

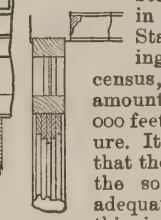
## Our Timber Supply.

Just how our reckless use of timber appears to intelligent observers on the other side of the water is reflected by an article which appeared not long since in the *Engineer*, published at London. It recapitulates many particulars connected with our lumber and timber supply to which our readers' attention has already been called. They will nevertheless be interesting when presented in the present form:

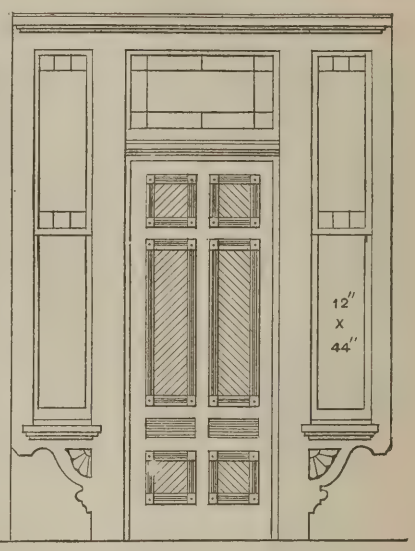



*House Design by "South."—Elevation of Front Porch.—Scale, ¼ Inch to the Foot.*

The prolific growth of timber trees in the United States, and the vast extent of their forests, induced customs and methods of construction among the earlier settlers which have resulted in the extravagant use of timber for all purposes, and systems of timber cutting without any attention to the renewal of forest growth, which bid fair to result in great embarrassment to the lumber trade. Within the last 25 years the price of white pine at the seacoast has trebled, and that of hemlock doubled. At the present rate of consumption there is about 11 years' supply of white pine now standing in the Northern States comprised in the area bounded by the Atlantic Ocean on the east, the Dominion of Canada on the north, the upper portion of the Mississippi River on the west and the Ohio and Potomac rivers on the south. In the Southern States the estimated supply of the long-leaved pine (*pinus australis*) is sufficient for many years, but much of it grows at a distance from navigable rivers and railway lines, and the supply convenient to lines of transportation has become so reduced that there is a scarcity of this timber for millwork and shipbuilding. The railways of the country annually require about 60,000,000 ties, or the product of 500 to 600 square miles of growth of such timber, and at places convenient to their lines. In Canada the annual cutting amounts to 2,000,000,000 feet, board measure; in the United States, according to their last census, the cutting amounts to 224,000,000 feet, board measure. It is considered that the resources of the soil would be adequate to replace this immense drain upon its production of the consumption of timber if care was taken to foster the new growth of forests and if forest fires could be checked. The ravages of forest fires result in the destruction of greater values than the losses of buildings by fire. The subject has been forced upon the consideration of the people, and the question of its remedy is receiving serious attention, but the most judicious plans lack the cooperation of those engaged in timber cutting until the supply in that immediate locality becomes nearly exhausted. The results of such efforts are shown in the statute laws of the Legislatures of the several States composing the United States. In this connection it may be said that, while the Congress of the Federal Government enacts laws of a national character, each of the several States exercises local self-government, subservient to the General Government, through laws passed by their Legislatures, and this question of tree preservation comes within the scope of the State authorities. Seven of the States have no legislation on the subject. Kansas repealed such a law, and Texas enacted a law giving to railway corporations the right to enter upon any land along their line and cut timber for con-

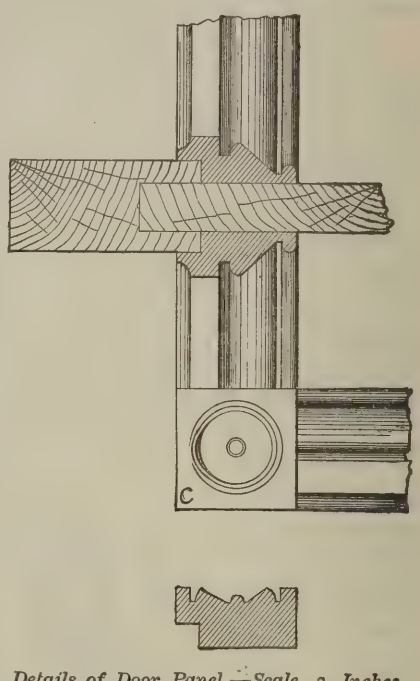


*Section of Arches in Front Porch.—Scale, 1½ Inches to the Foot.*

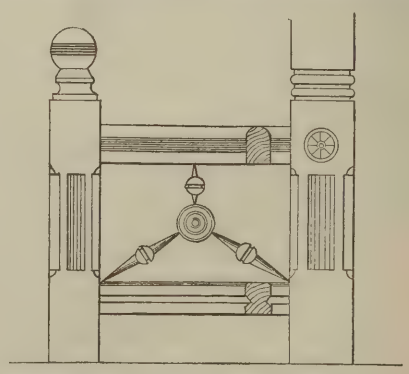



*Front Door.—Scale, ¼ Inch to the Foot.*

structive purposes—a law which can be understood when it is considered that only a small portion of its immense area has been occupied by actual settlers, and the enactment is a portion of the legislation designed for the promotion of railway construction as an efficient means for encouraging immigration into the State. The laws of the remaining States for the furtherance of tree culture are of two classes. Nineteen States are provided with protective laws which defend

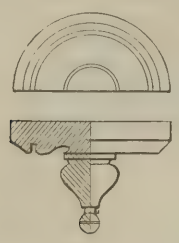



*Details of Door Panel.—Scale, 3 Inches to the Foot.*



*Detail of Front Porch Railing.—Scale, ½ Inch to the Foot.*

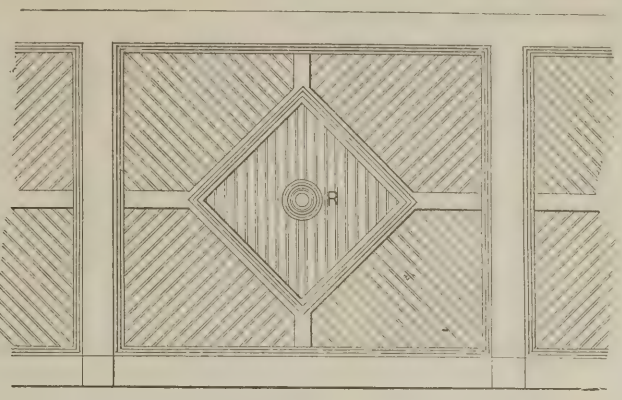
the owners of trees against acts of injury by providing fixed and excessive penalties for all acts against trees, and thus relieving the owner of the excessive burden of proof of value of the damage, &c., which would



*House Design by "South."—Detail of Rosette R in Ceiling of Front Porch.—Scale, 1 Inch to the Foot.*

be necessary if, in the absence of such statute law, he was obliged to limit his course of action to a proceeding under the common law, governed by the same principles of just remedy for a wrong common to all Anglo-Saxon people.

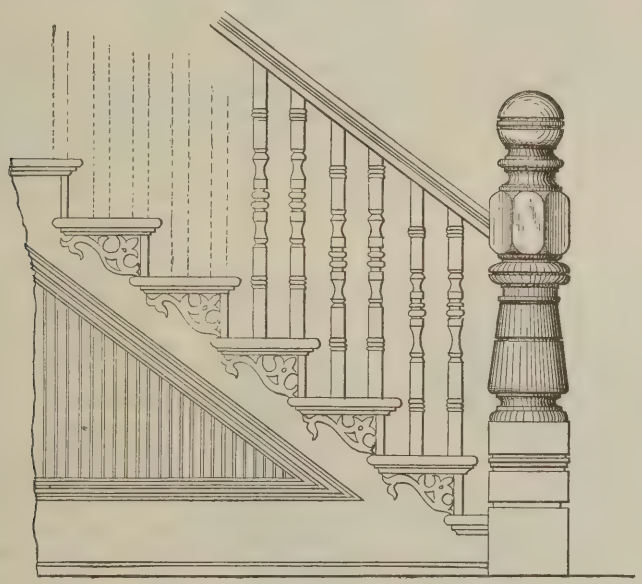
In the remaining 17 States these protective laws are still further re-enforced by subsi-



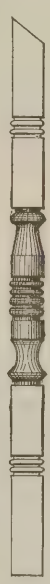

*Plan of Ceiling of Front Porch.—Scale, ¼ Inch to the Foot.*

dizing laws which, in addition to the special legislation for the defense against wrong-doers, also grant various bounties and immunities to those who plant trees. Most of these laws show an intelligent appreciation of the subject, although in s me States there are limiting conditions which restrain the application of such favors and give rise to a presumption that the bill was drawn up by an enthusiast and amended by a practical politician; as, for example, in Rhode Island, where plantations of forest trees, numbering 2000 to the acre, are exempted from taxation for 15 years after the trees have reached a hight of 4 feet, but this applies to land worth less than $25 per acre. Now, this State has a population of 280 to the square mile, distributed in factory villages on fertile land around the water-courses, which cannot reach the sea except through the water-wheels of the numerous small mills scattered over the State, and any land in that State valued within the statute limit must be too sterile to sustain a tree for every 22 square feet of area.

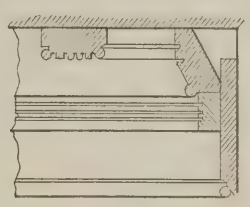
California requires certain county officers to encourage the planting of trees along the highways, and gives $1 bounty for every living tree four years old. The laws of Michigan, Massachusetts, Nebraska, New Hampshire, New York and Wisconsin contain wise provision for the encouragement of tree-planting along the highways, on the principle that the result of such action is twofold, for, in addition to the benefit accruing to the highway and the abutting property, it has an inevitable tendency to encourage tree-planting elsewhere. The remaining States further this result either by payment of money premiums or abatement of taxation, or both. In some States it is the custom of the Governor to issue a proclamation once a year, decreeing a public holiday for the purpose of tree-planting along the highways. The presentation of facts showing the alarming diminution of the standing forests, by the Census Bureau and other official sources, and the continual action of associations organized for this purpose, are resulting in measures tending to check the destruction of forests.



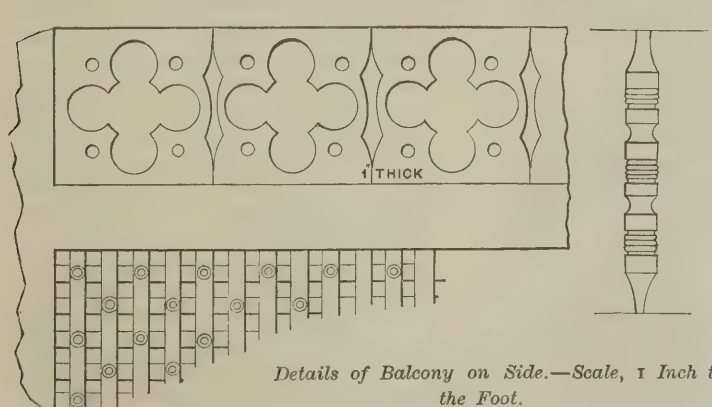
*Detail of Stairway.—Scale, ½ Inch to the Foot.*



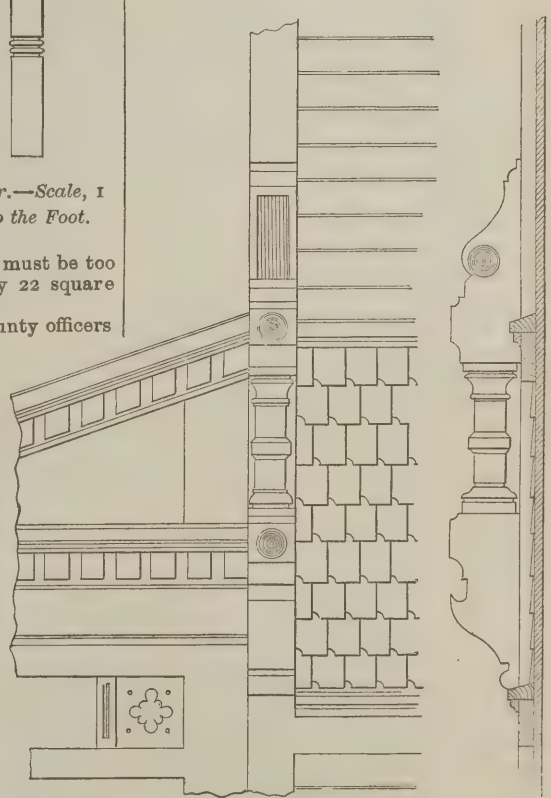
*Baluster.—Scale, 1 Inch to the Foot.*



*Detail of Cornice of Front Porch.—Scale, ½ Inch to the Foot.*



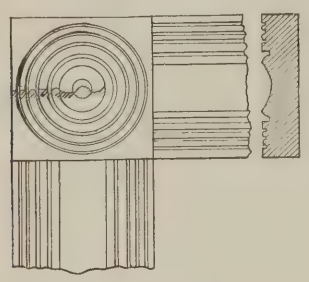

*Details of Balcony on Side.—Scale, 1 Inch to the Foot.*



*Details of Bracket to Receive Front Porch Cornice at Side.—Scale, ½ Inch to the Foot.*

## Decorated Ceilings.

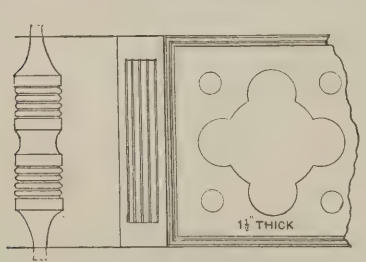
The attention bestowed upon ceilings today is very marked. In all houses of good rental some attempt is made to relieve the dead whiteness of ordinary plaster and stucco, not always very happily, it is true, but on the whole the movement is in the right direction. To appreciate what can be done in this one item of interior decoration, it is only necessary to visit the leading decorators in the city. Not only are artists of



*Details of House by "South"—Inside Door Trimming.—Scale, 1½ Inch to the Foot.*

the highest order engaged to decorate with the brush, but materials of various kinds are used either singly or in combination. We find carved wood, embossed and gilded leathers, tapestry and canvas, and even stained or enameled glass, while a still more recent fashion takes the form of French mirrors. Some of the mansions of the more wealthy in this city have ceilings varying in every room, but all invariably highly decorated. A dining-room, for example, will have a ceiling ornamented in panels and medallions after most beautiful designs, painted in oils. One which we have in mind had upon the panels copies exquisitely made from Raphael's Vatican cartoons, while the medallions bear wreaths of delicate and fragile flowers, from which peep laughing cherubs. In the library darker effects are sought by the use of woods. The more modern style is to rely for effect not so much upon elaborate carving as upon the light and shade produced by the tones of the wood when polished and paneled. Mahogany is especially effective and is as much in favor for this purpose as for every form of decoration at the present time. In music-rooms the introduction of red is considered very desirable, and cherry is much used, while occasionally California redwood plays an important part.

One of the most beautiful ceilings we have recently noticed was a Japanese design in carved wood. Brought out in fantastic relief against dark red Souchow was a pagoda shaded by drooping foliage of almost impossible trees, beneath the spreading branches of which sat a group of Orientals in apparent contemplation. Many considerations enter into the question of the embellishment of ceilings. An artistic decorator first makes himself master of all the architectural de-



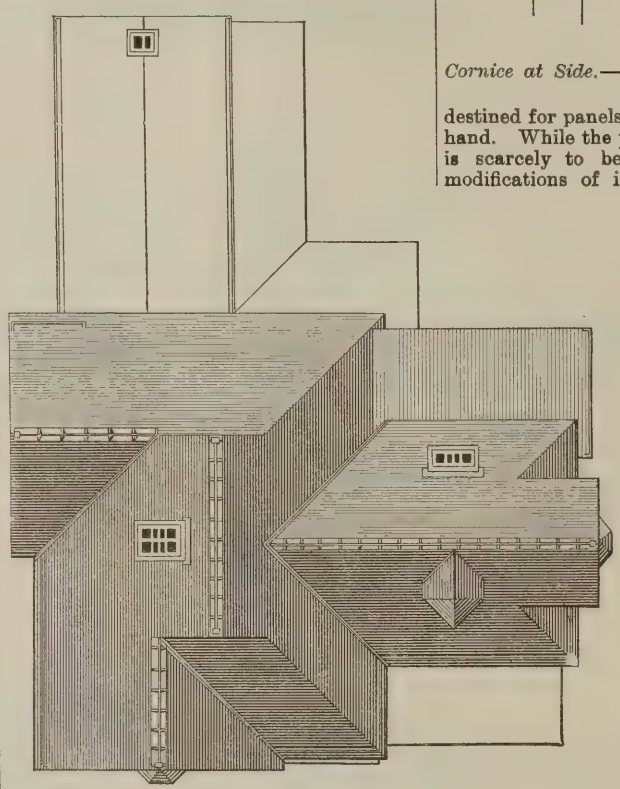

*Details of Spindle and Panel Work—Front Veranda.—Scale, 1½ Inches to the Foot.*

tails of a room; if it is already furnished expensively, or has fittings of a permanent character, the choice of appropriate ornament for the ceiling is of course greatly limited, and still more so where stained glass plays any part in the windows. Large establishments in the city have quite a staff of artists, mainly Italians, French or Germans, and when the question of interior decoration comes up one of them is deputed to examine the room and report as to the most suitable form to be selected.

Of the various styles now in favor the most popular are those known respectively as the Chinese, Japanese, Moorish and Renaissance.

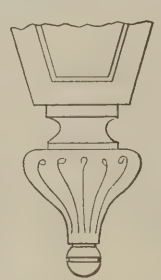
*Rosettes.*

Where the fittings and furniture of a room are of an Oriental character, it is now considered proper to decorate the ceiling in Moorish designs. *Papier-mâché* is a material recently introduced which is evidently effective in combination with gilding or raised goldwork, and plays an important part as setting or framework for panels, medallions, &c. In many instances where expense is no object whatever, semi-jewels figure conspicuously in the illumination of the ceiling. All the brilliant and gleaming effect of a mine of various gems is thus introduced in



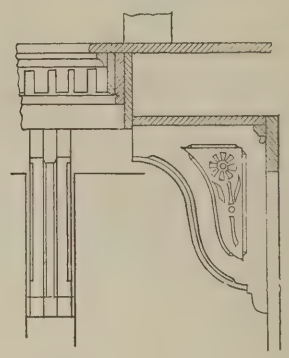
*Roof Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.*

the inverted order, and the dazzled spectator beholds over head a rich profusion of coloring difficult to paint in words. At other times French mirrors of rhomboidal form are used in the place of the jewels, and form innumerable flashing centers in framework of plaster, heavily overlaid in gold, with every beautiful device that fancy can picture. An exquisite border for a ceiling of this description consists of a row of mammoth palm leaves.



*Pendant in Arch of Veranda.—Scale, 1½ Inch to the Foot.*

A ceiling conspicuous for artistic excellence is in hand for a newly-decorated house in the city. The design intended for the drawing-room is exceedingly beautiful. The center is a historical picture in oil by one of the Academy artists. Four panels continue the theme, and the intermediate spaces are occupied by rare medallions, all of which interpret by a kind of by-play the grand and dominant idea of the center. It is scarcely possible to do justice to the exquisite delicacy of the details displayed in the border which is the setting of this beautiful work of art. Composed of raised and ornamented plaster, every line becomes a line of beauty. Great interest attaches to the methods by which these ceilings are produced, and the workshop attached to a large decorative establishment will repay a visit. There the artist creates and the artisan carries out in various materials the design submitted to him. The most beautiful effects are arrived at even in plaster, and designs of fruit and flowers, foliage, or even figures,

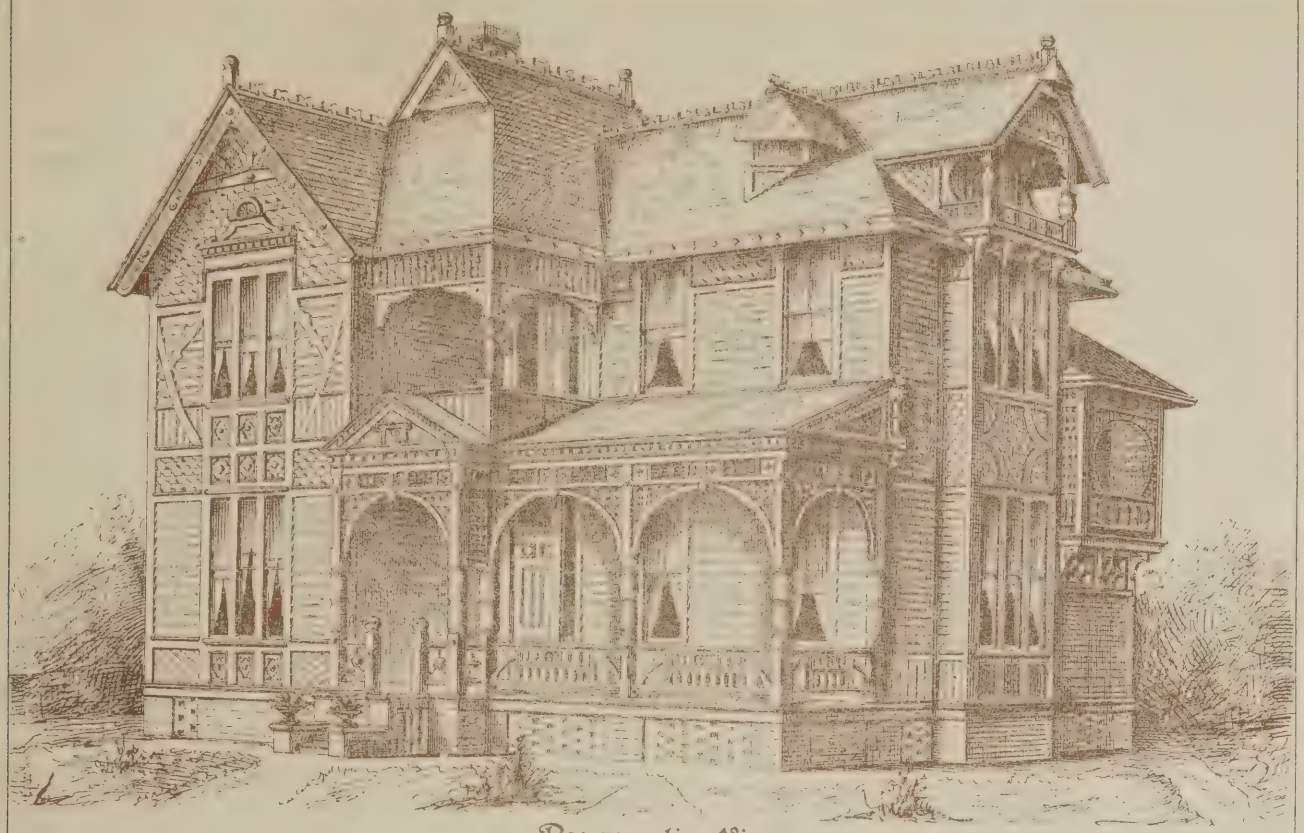


*Cornice at Side.—Scale, ½ Inch to the Foot.*

destined for panels, are to be seen on every hand. While the plain white plaster ceiling is scarcely to be considered fashionable, modifications of it in which deep borderings are introduced are very usual. Intricate designs are molded in this material, and serve their part either as panels or medallions.

Perhaps one of the most curious materials used in ceiling decoration is that known as "mosaic glass." It will be readily understood that it is fitted only for houses where luxurious appointments predominate, and its use is mainly restricted to the ceilings of large dining-rooms or banqueting halls. The method of preparation differs somewhat from that of ordinary stained glass. A coating of gold or silver leaf is supplied as a background, the result being that, instead of the beauty of effect depending upon passing rays of light, the most brilliant results follow from side lights. The effect is enhanced where jewels and crystals are introduced. Leather, as we have seen, also plays its part in ceiling decoration. The gilded and illuminated leathers in imitation of the antique are much used, generally in combination with cross-bars of wood, while embossed and painted leathers are also much liked for the reason that they catch every varying ray of light, and give a different appearance to the room at different hours of the day. The cost of ceiling decoration varies, of course, considerably. A plain fresco, which is sufficiently effective, may be painted for $150, while some of the more elaborate ceilings in the city cost over $1000, and the expense is practically limitless. If we enter upon a consideration of the artistic value of such ornamentation, we find ourselves entering upon a wide field, so much necessarily depends upon surroundings. There are plenty of cases where a plain white ceiling, picked out with a bordering of deep color, is more effective than the most elaborate painting or combination would be. In the majority of cases—in all houses, in fact, of ordinary size and value—the less brilliant the coloring of the ceiling the better, whereas in mansions, public buildings and banqueting halls great latitude may be allowed.

PLATE XIII.

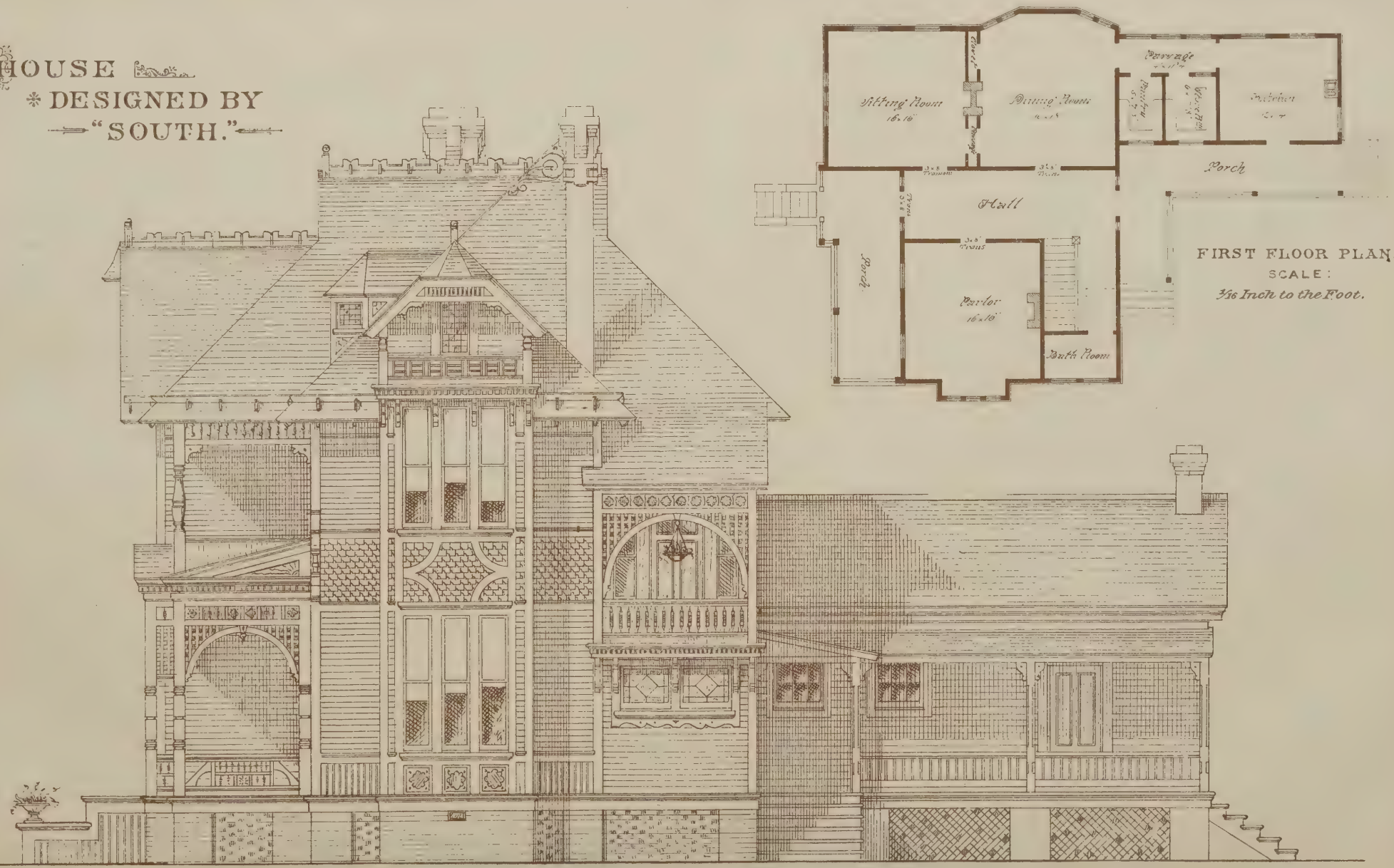


Perspective View.

# HOUSE
## DESIGNED BY
## "SOUTH."

FRONT ELEVATION.—*Scale, ⅛ Inch to the Foot.*

# HOUSE DESIGNED BY "SOUTH."

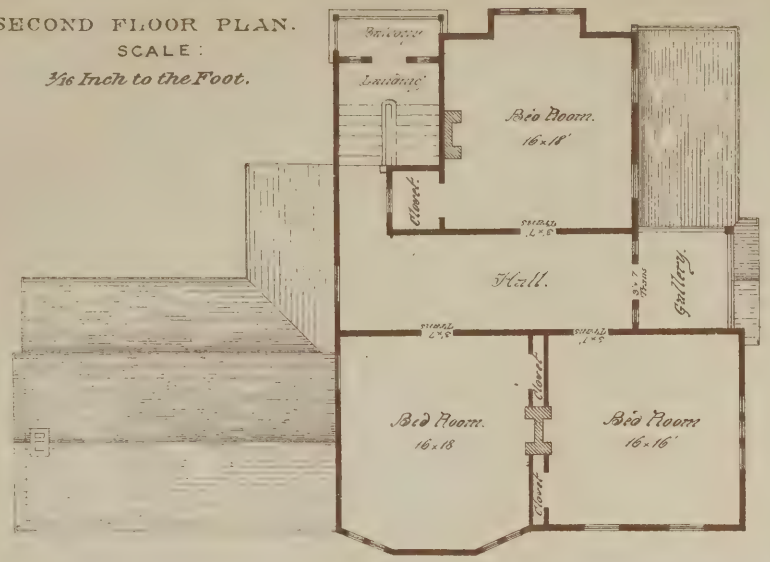



FIRST FLOOR PLAN.
SCALE:
*3/16 Inch to the Foot.*

SIDE ELEVATION, [RIGHT]. *Scale, 1/8 Inch to the Foot.*

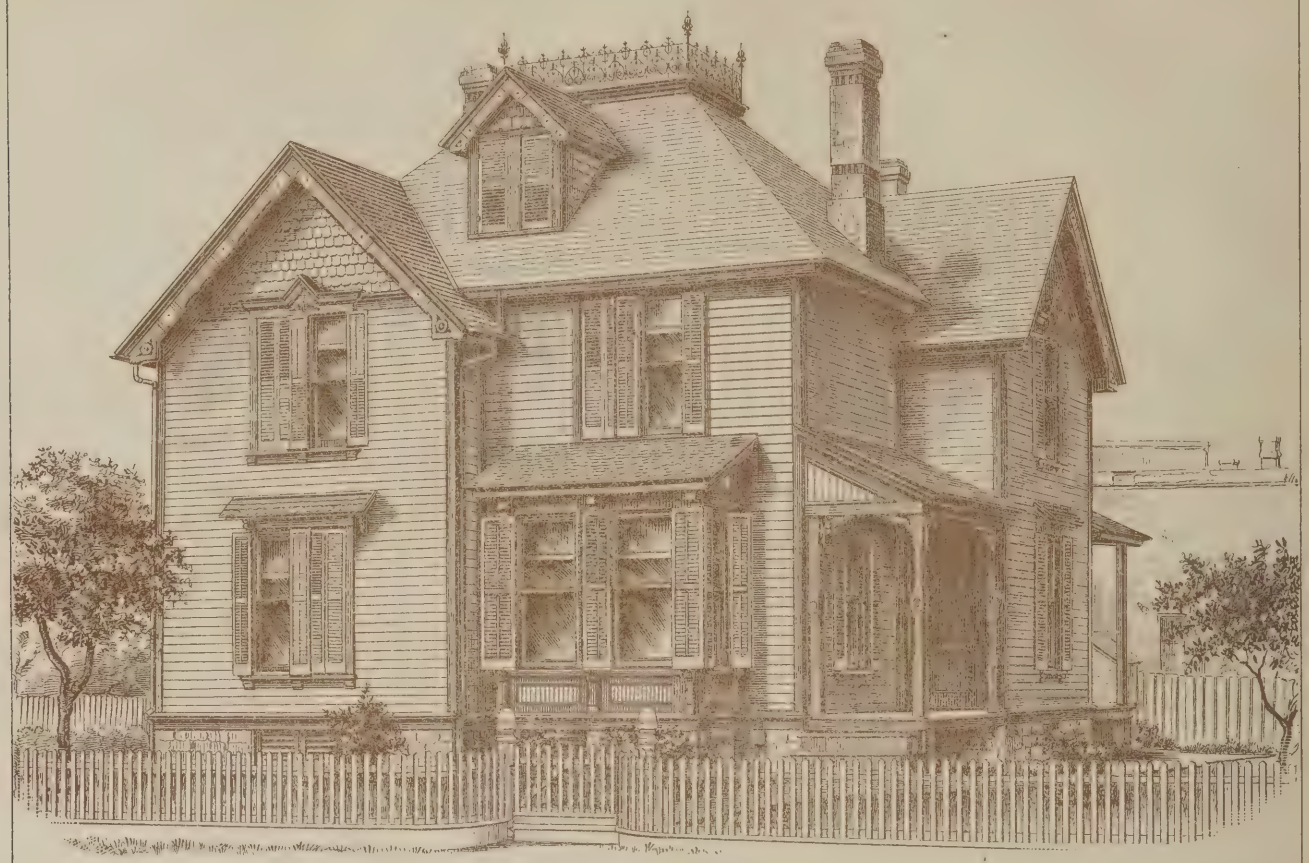
# HOUSE DESIGNED BY "SOUTH."

SECOND FLOOR PLAN.
SCALE:
*3/16 Inch to the Foot.*



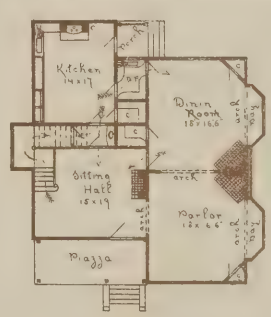



SIDE ELEVATION, [LEFT]. *Scale, 1/8 Inch to the Foot.*

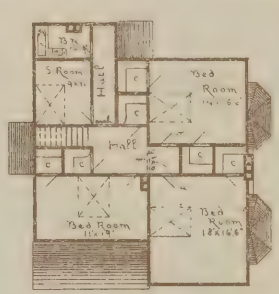


HOUSE DESIGNED BY C. L. GRAHAM.

(For Floor Plans see Page 52 March Number.)

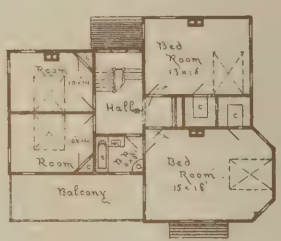



* Ground Floor *




* Second Floor *

* Ground Floor *



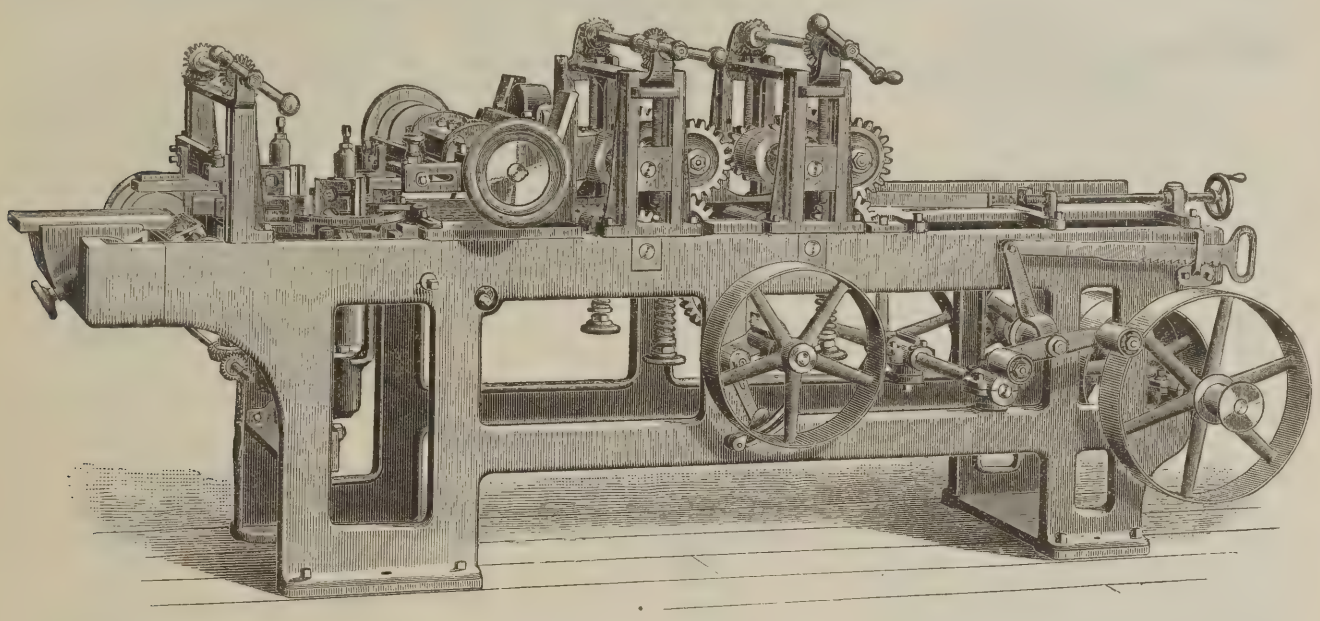

* Second Floor *

COTTAGE DESIGNS, BY ARTHUR L. VALK, ARCHITECT, NEW YORK.

# NOVELTIES.

### A New 10-Inch Inside Molder.

Messrs. C. B. Rogers & Co., of Norwich Conn., are building a new 10-inch inside molder, shown in Fig. 1 of the illustrations. It is a radical change from other molders of their make, and possesses some new features that will recommend it to every practical operator. It is arranged to work 10 inches wide and 6 inches thick, with all necessary adjustments for sticking moldings of every style, also flooring and ceiling. The top and bottom cylinders are made from solid crucible steel forgings, head and journals in one piece, and are slotted on four sides. The pulleys are provided with a large flange which acts both as a balance-wheel to carry the cylinder through a heavy cut and as a convenient means of turning the cylinder when setting the cutters. The top cylinder is adjustable endwise across the machine, effecting a great saving of time in setting molding cutters. The lower cylinder is raised and lowered to any desired position in the same manner as the top one. Boxes for both top and bottom heads are connected in yoke form to avoid any cramping. The side spindles are moved to any desired position across the bed by means of screws, and both spindles can be tipped to work at an angle. All bonnets, chip-breakers and pressure bars are arranged to swing clear of the cutters in the heaviest work, and may be thrown back or removed entirely when setting or sharpening knives. The opening in the bed for the lower cylinder may be enlarged or diminished at pleasure, and the entire end of the frame can be swung off to one side, giving free access to the lower cylinder. The feed is very powerful; rolls are geared at both ends, and feed-roll shafts arranged so that wide rolls can be removed and narrow or spur rolls substituted without loss of time. The feed may be set at any speed desired. The tight and loose pulleys on the counter-shaft are 10 x 6, and should make 1000 revolutions per minute. Belting required: 46 feet of 3½-inch for top and bottom cylinders; 40 feet of 3-inch for side heads and feed. The New York office of Messrs. Rogers & Co. is at 109 Liberty street.



*Novelties.—Fig. 1.—New Ten-Inch Inside Molder, Built by Messrs. C. B. Rogers & Co., Norwich, Conn.*

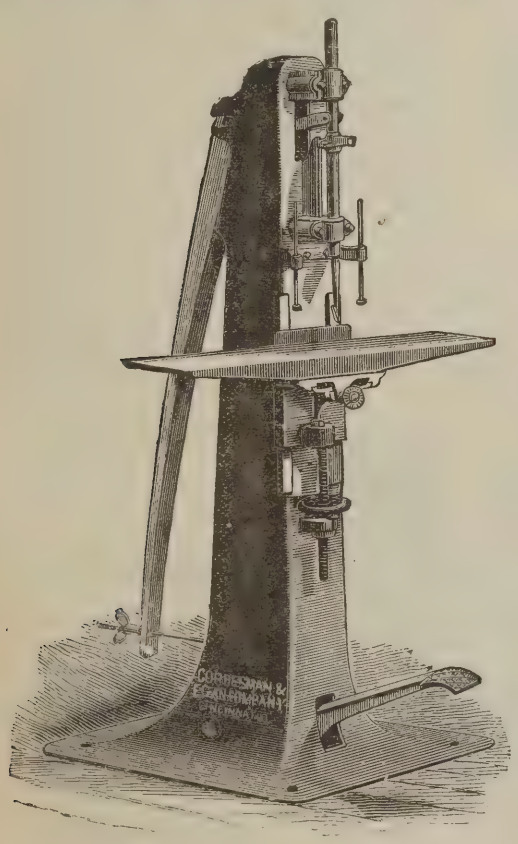


*Fig. 2.—Foot Mortising Machine.*

### Foot Mortising Machine.

The Egan Co., of Cincinnati, are directing attention to the foot mortiser shown in Fig. 2 of the engravings. The machine has the advantage of a chisel reverser of unique character and also a combined treadle giving great leverage. A number of machines have been made and are in use in various parts of the country. The company claim for the machine that it is more powerful than any other yet introduced. Its construction is simple and of a character to meet the approval of builders. The frame is cast in one piece with a broad base, making a solid support for the machine. The table has a vertical and also a horizontal adjustment. It is raised and lowered by the hand-wheel shown near the center of the engraving. The ways on which the table is raised and lowered are cast on the frame and make a solid bearing for the table. It is so constructed that any wear on these parts can be readily compensated. The spring shown at the back of the machine is of ash, and is arranged in such a manner as to be very effective. The machine is adapted to use in various classes of chisels and cutting tools.

### New Door-Knob Fastening.

Messrs. Charles P. Leggett & Co., No. 478 Pearl street, New York, are directing attention to an improved fastening applicable to all kinds of door knobs, the nature of which will be understood by Fig. 3 of the engravings. Those of our readers who have had trouble with knobs of ordinary construction in which the socket is fastened to the knob by lead or composition will appreciate this strong and durable connection. The socket is made in two parts, being divided longitudinally, as indicated in the sectional view. It is spread at the lower end so as to form a dovetailed joint with the knob. The socket is divided as mentioned in order to insert it in the opening in the knob. After the socket has been applied in this way a ferrule or sleeve of heavy sheet metal is put over the two parts of which it is composed, and fastened by countersinking at the screw-hole. The result is a fastening which for strength and durability is a great improvement over those in common use. It is very neat in appearance and affords very little indication of its construction. No screws or washers are used in fastening the socket in place, and it cannot become detached save only when the knob is split or broken.

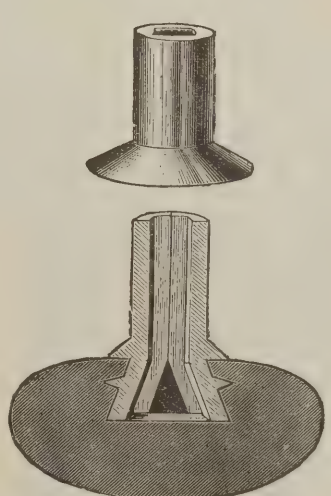
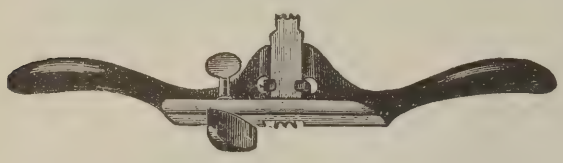


*Fig. 3.—New Door Knob Fastening.*

### Universal Hand Beader.

The Stanley Rule and Level Co., of New Britain, Conn., are introducing the Universal Hand Beader, shown in Fig. 4 of the engravings. In the use of ordinary beading planes the wood-worker of the present day is likely to be confronted very frequently with the difficulty of extending a



*Novelties.—Fig. 4.—Universal Hand Beader.*

perfect bead along the edge of curved work. The difficulty becomes greater where concave and convex surfaces require beading. Reeding or fluting is equally difficult in all places except in straight lines or in level surfaces. The tool is intended to supersede regular planes for work of this kind. The piece of work shown in Fig. 5 was done with it, and the sectional views presented in Fig. 6 indicate some of the patterns which may readily be produced by it. It is not supposed, we are informed by the makers, that this tool will supersede machines in factories, but it is believed it will be found useful in jobbing and in doing a wide range of handwork. The tool in some of its general features resembles a draw-knife or scraper, having some of the features of each of these articles. The stock is made of iron and the handles are raised from the plane of the cutting edge. The cutters are flat pieces of steel, held in place by clamping by a thumb-screw which draws from the back. In order to economize material and to produce the largest assortment of patterns in the smallest number of pieces, the cutters are sharpened at both ends, so that each one gives two different patterns. The range of patterns possible is practically unlimited, and the cost of additional cutters is very

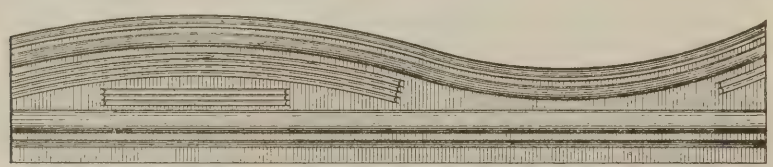


*Fig. 5.—Specimen of Work Done With the Hand Beading Tool.*

small. Blanks for cutters are supplied by the makers. The gauge shown on the tool in the illustration is for use on curved work. Another gauge is also furnished, having a long straight bar, adapting the tool for ordinary work. The gauges are reversible and can be used on either side of the cutter, as the convenience of the workman may de-

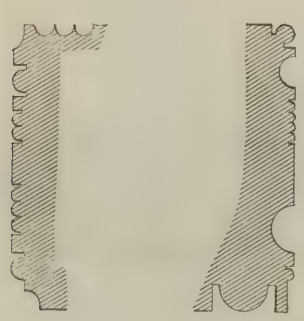


*Fig. 6.—Profiles of Beaded Work.*

mand. They may be shifted from one side of the cutter to the other without being separated from the stock. The engraving represents the front view of the tool. The cutter is set in the stock with a pitch like that of a scraper. The tool is worked from the person. An opening in the stock just in front of the cutter exhibits the working of the tool while the work is in progress. Careful examination of Fig. 5 will indicate the range of work possible to be done, and how forms may be commenced and ended in a piece where it is not wished to extend them to the end.

### Brainerd's Saw-Set.

Fig. 7 represents Brainerd's Compound Lever Saw-Set, now being put upon the market by Giffing & Marvin, of No. 79 Chambers street, New York. The tool is shown about one half size. The gauge operated by the thumb-screw at the bottom determines the space of the tooth that is put under the lever. The upper gauge operated by the upper set-screw is regulated to suit the thickness of the blade of the saw to set. The name of the article, Compound Lever, indicates the nature of its operation. On pressing the handles the lever carrying the set or die is brought down hard

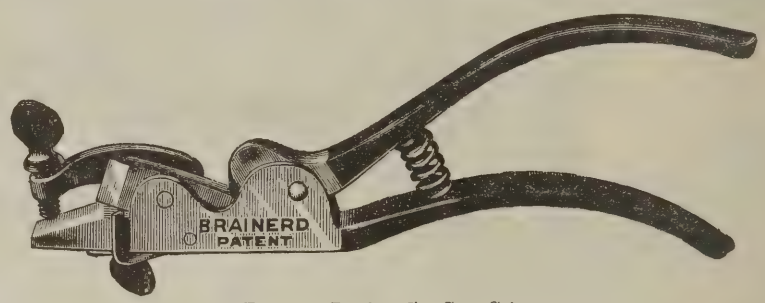



*Fig. 7.—Brainerd's Saw-Set.*

against the tooth, thus slightly bending it against the bed or mandrel. The spiral spring between the handles forces them apart when the hand is released.

### Security Door Hasp.

The Sweet & Clark Mfg. Co., Troy, N. Y., are making this article, which is illustrated by the cut below, Fig. 8, from which its general features will be readily apprehended. It will be perceived that it is a combined spring bolt and hasp, having a double staple, with one opening for the bolt and another in which a padlock can be inserted when it

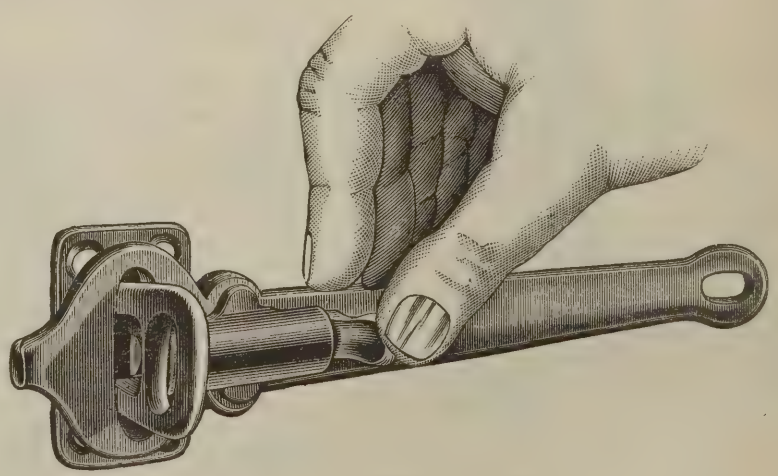


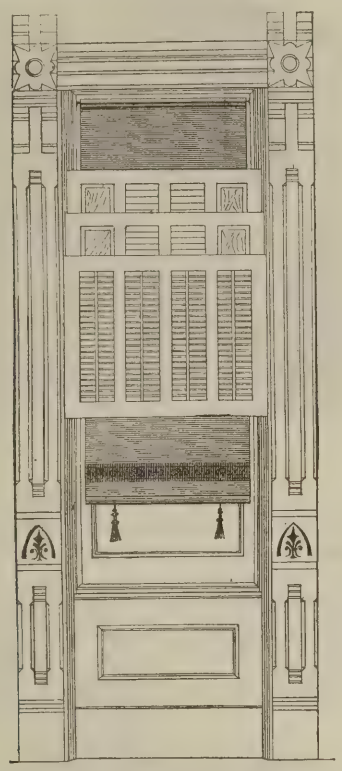
*Fig. 8.—The Security Door Hasp.*

is desired thus to secure it. Thus, it is pointed out by the manufacturers, it serves the double purpose of a latch and lock. It is 7 inches in length, made of malleable iron, tinned, and with each one a staple and screws are furnished.

### The Application of Mineral Wool.

The United States Mineral Wool Co., of New York, have recently issued a circular entitled "Where Mineral Wool is in Use." A large number of names and addresses are given showing where it has been applied for the protection of water-pipes, around heaters, stoves and gas apparatus, in steam distribution, railway-car construction and in ordinary houses. There is also presented in the circular some facts referring to the application of mineral wool that will be of material interest to our readers. We append extracts as follows: "There is a struggle going on under every roof between the cold and the heat which, though unseen, is not without its interest to the occupant of the house. The matter of creating warmth is the only one that need be considered, for the relation of heat and cold is such that if you provide against the severity of the former you at the same time protect yourself from the intensity of the latter. There is this difference, however, in the supply of heat: there is economy to be practiced, and this narrows the field of our work down to the simple question of protecting a house from the cooling effects of the weather. A corner room whose vertical walls are hollow cannot be said to be comfortable when heated by a stove, for the reason that the surface of the stove has a temperature of 180°, while the interior surface of walls has a temperature of 40°. The problem before us in this case, which is the one presented to every man in building a dwelling, is how to construct the exterior walls so that the temperature of the interior surface shall remain at 60° while the temperature of the exterior surface drops down to 20°. It will at once seem apparent that this is only a question of thickness of the walls. If all walls were made of one material, then this conclusion might be sound. But all the substances which, in one shape or another, might be used in the construction of the wall have a definite value as to their capacity for conducting heat. For instance, the conducting power of brick was determined in connection with that of various other substances by Pèclet to be 4.83—that is, this fraction represents the quantity of heat in units transmitted per square foot per hour by a plate 1 inch thick. By taking the value of mineral wool to be 0.323, which is the value of sheep's wool and cotton wool (as a matter of fact, it is 10 per cent. poorer than either of them), we can ascertain accurately

the quantity of heat which a wall of any given thickness will allow to escape. Thus a wall of brickwork 4 inches thick, having one surface at 60° and the other at 20° will transmit $(4.83 \times (60-20) \div 4) = 48.3$ units per square foot per hour. Mineral wool in place of the brickwork gives $(0.323 \times (60-20) \div 4) = 3.23$ units per square foot per hour. From the result it is plain that the brickwork would have to be 40 inches thick



*Novelties.—Fig. 9.—Elevation of Window Fitted with Hartman's Sliding Blinds.*

to retain the same amount of heat that 4 inches of mineral wool do. This illustration does not exceed the limits of truth. It brings out the fact, one difficult to reconcile with our general notions in this regard, that all materials are conductors of heat and differ from each other only in degree. Stone and marble are such high conductors that, if placed around pipes, the loss with all thicknesses is greater than by an uncased pipe, and the thicker the casing the greater the loss. There are some concoctions that really appear to have the solidity of stone or marble, and possibly are dispensing heat out into space faster than the law requires. The man who wishes to buy a low conductor should keep in mind the law that all good absorbents are bad conductors, and, when one of the so-called 'non-conductors' is offered him, to fill a tumbler to the brim with water and then immerse a large piece of the material in it. If the substance under trial is a very low conductor the water will not spill, but will be absorbed so that a volume equal to that of the tumbler may be immersed."

At this point in the circular an engraving is introduced illustrating the conventional Queen Anne cottage, so popular among architects, especially in the eastern portion of the country at the present time. The building is low, with a very prominent roof, inclosed porch, and the usual features pertaining to the fashion in architecture referred to. The circular continues: "The accompanying cut shows a style of dwelling very popular among the architects, but not designed for the comfort of the occupant. Unless the low roof is filled in with mineral wool the rooms on second floor of this house will be insufferably hot, and, while the architect is really to blame, not so particularly for sacrificing everything to looks, but for ignoring the fact that the sun's heat is certain to be transmitted, still there is no use ever expecting him to give attention to insulation, because the part of the house devoted to this object is bound to be hidden, and his profession does not thrive on the invisible. The owner is the proper one under the circumstances to see that the hollow walls of his balloon-frame residence are filled with some poor conductor both of heat and sound. By using mineral wool he would not only have the most efficient barrier against the passage of heat, but render the house secure against fire attack and free from the inroads of rats, mice and insects. Not only would these desirable objects be accomplished, but in a few years the expense of such a filling will be offset by the economy of heating and reduction or absence of insurance."

### New Sliding Window Blinds.

New features in sliding window blinds are being offered to the trade by Hartman & Durstine, of Wooster, Ohio. A very elaborate system has been devised, patents on which are at present pending. The general features of the system will be understood by the engravings presented herewith. A leading claim made by the makers for this system of blinds is that there are combined more desirable features than can be found in any other one system. Referring to the illustrations, Fig. 9 represents a view of a sliding blind with three sections placed in position in the window, partly raised and partly lowered, from which the action will be readily understood. The window shade is shown in place behind the blinds. The illustration also shows how the

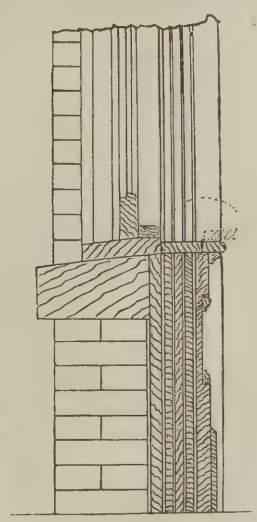


*Fig. 10.—Section Showing Pocket for Blinds Behind a Panel.*

blinds may be constructed with stationary or rolling slats, as may be desired. Solid panels likewise can be used. Either section can be placed in any part of the window, and the fittings are such that it will remain wherever placed. Fig. 11 represents the same window with the blinds neatly stored at the floor in front of the panel. In this position they are entirely out of the way, and do not obstruct the light in any respect. Fig. 10 is a sectional view, and shows another method of storing the blinds, in which they come down behind the panel finish of the bottom of the window. An adjustable window sill is introduced which closes up the space above the blinds when thus stored. The sill is hinged, and swings as indicated by the dotted line when it is desired to lift the blinds from out of the pocket. Among the advantages claimed for this method of disposing of the blinds when not desired for use are the readiness with which access can be had to them and the neatness of finish secured. Other variations which we have not space to illustrate employ two sections of rolling slats and one section of stationary slats, the outside divisions being paneled. An improved metallic blind rod is used, so constructed that the sections are permitted to pass each other in sliding without the necessity of increasing the depth of the blind guides. The new rod takes the place of the old-style wooden rod, and is made in brass, Berlin bronze and in other styles. In Fig. 12 is shown a single division of sliding blinds, in which the inside divisions are hinged and may be swung outward when desired. This is accomplished without any material change in the general system already referred to, and could be used in the window illustrated in Figs. 9 and 11. It will be seen that metallic springs are employed on the right of the section. These perform the office of

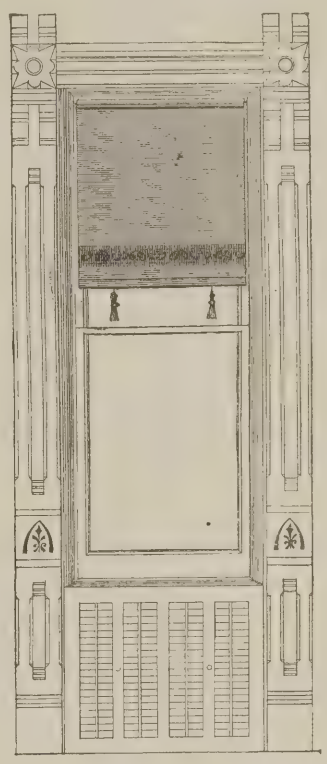


*Fig. 11.—The Window Shown in Fig. 9 with the Blinds Down.*

holding the section in place wherever it is desired to have it remain. One side of the blind grooves or guides is made deeper than the other, and the springs shown enter the same and are entirely hidden from view. To remove the blind sections from the window for cleaning or for any purpose it is only necessary to give sufficient pressure against the spring to let the section pass out of the groove at the opposite side. Any or all of the sections from a window may be removed in this manner without the use of a screw-driver or other tool. In the pamphlet which Messrs. Hartman & Durstine have sent us various forms of construction employing these blinds are illustrated, showing how they may be adapted to different conditions. Various modifications, such as a wire

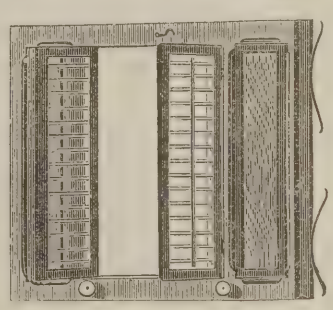


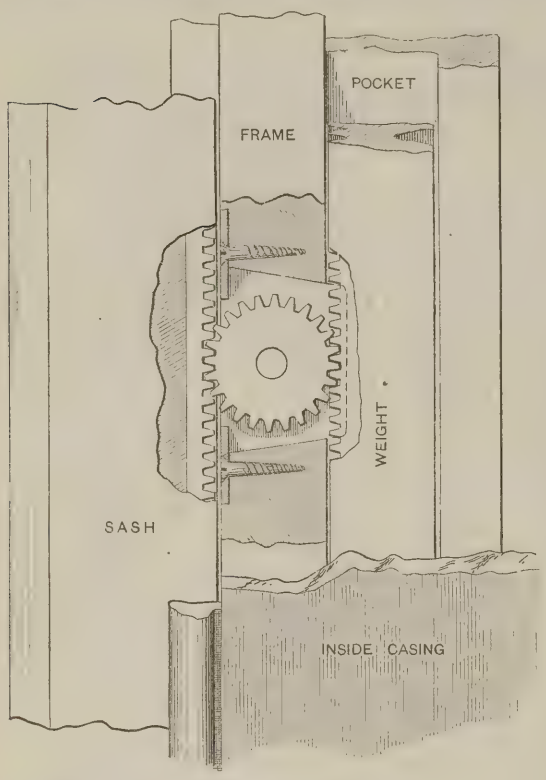
*Fig. 12.—Blind with Hinged Panel.*

screen section, are also illustrated. Statements of advantages are presented which are of interest to every builder.

### New Mode of Hanging Sash.

Figs. 13 and 14 show by vertical and horizontal sections the features of a new method of balancing window sash that is just being put upon the market by W. F. Lennon, No. 124 East Eighty-fourth street, New York. The outside of the sash is provided with a rack, as is also the inside face of the weight. The

latter is in the form of a bar approximately as long as the window sash is high. A pinion is pivoted in the frame near the meeting rail. The weight is adjusted according to the size of the sash, and the arrangement of parts is such that the equipoise is maintained at whatever position the sash may be placed. The weights are




*Novelties.—Fig. 13.—Vertical Section Through Frame and Sash Fitted with Lennon's Sash Weight.*

arranged in such form as to be readily increased or diminished as circumstances require. The parts are simple, the movements positive, and several important advantages are secured over the usual plan of suspending with cords. Among these may be mentioned that no cords or other unsightly fixtures are in view, and that the sash is held in such a way as to avoid shaking or rattling. The horizontal section presented shows how the woodwork may be arranged to accommodate this fixture, while the vertical section shows the position of the pinion between the two racks above described.

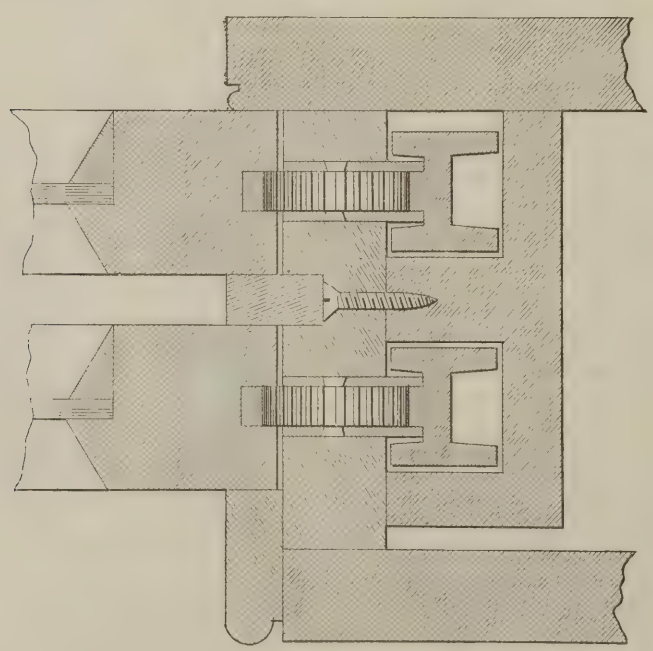


*Fig. 14.—Horizontal Section, Showing Application of Lennon's Sash Weight.*

### The Raymond Sectional Heating Boiler.

The Raymond Furnace and Mfg. Co., 76 Beekman street, New York, have brought out a new cast-iron sectional boiler and heater, shown in Fig. 15. By the addition of sections the boiler can be built up to any desired size, varying from a boiler suitable for a small house to one having the necessary heating power for a large building. The sections are separately bolted together by means of inside projecting lugs, and at the bottom the water-legs are fastened together by brass right and left water connections. A special feature of this boiler is that it has a continuous steam space and also a continuous water space except in the water-legs. The latter, however, as mentioned above, are connected at the bottom, so that there is always a free circulation of water between them. The boiler has two rows of horizontal flues. The heated products of combustion from the coal are drawn to the back of the furnace, and from there are deflected through the lower row of flues; from the front of the boiler they are again deflected back through the upper row, and thence pass to the chimney. The horizontal flues are a feature to which the manufacturers particularly direct attention, as by this construction the flues can be readily cleaned without having to put out the fire. Besides the longitudinal horizontal flues there are also two rows of cross flues between each section which serve to increase the heating surface of the boiler. The boiler is set in brickwork, and, where so desired, hot air connections may be made with the space between the boiler and the setting, so that the heat of the water may be utilized for indirect heating. This arrangement is said to have given great satisfaction where used, as rooms may be heated even when there is no positive steam pressure. The right and left water connections at the bottom of the water-legs, being of brass, do not rust, so that the boiler may be taken apart, if necessary, without danger of breaking the sections. Rocking grate-bars are employed, and the boiler is fitted with all the usual automatic arrangements, a full set of wrought-iron fire tools being also furnished in each case. The apparatus has interest for architects and builders, on account of its portability as well as general efficiency.

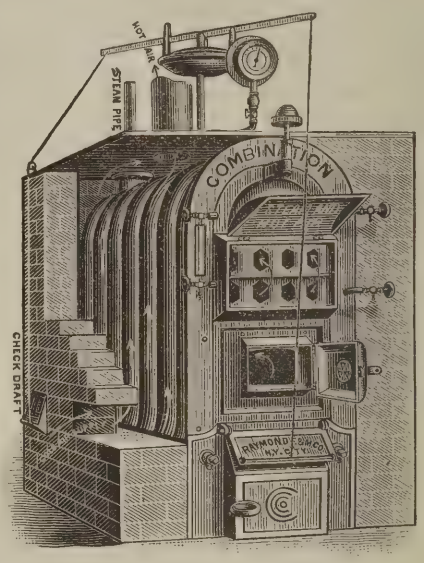



*Fig. 15.—New Sectional Boiler.*

### New Sash-Cord Fastener.

In Figs. 16 and 17 we illustrate a new sash-cord fastener recently patented by Land & Rathiens, and for which Butler & Constant, 18 Warren street, New York, are agents. The first view shows the application of the device to a window sash, while the second illustrates the article itself. The invention consists of a block of metal having an eye or opening in its upper end for the passage of a cord and a recess back of the eye to form a cavity for the reception of a knot formed on the cord. The block fits into a groove at the lower end of the side of the sash, and, abutting against the upper edge of the groove, sustains itself in position on the sash, and fastens the cord in such a manner that when the cords break the block can be removed and the cord refastened, repaired or otherwise manipulated without removing

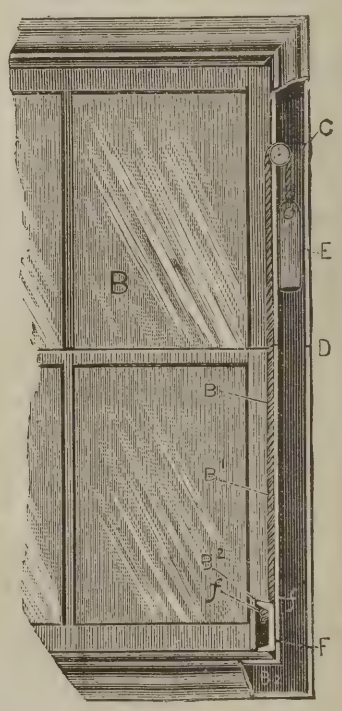
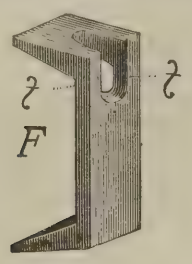



*Fig. 16.—Sash Fitted with Land & Rathien's Cord Fastener.*

the sash from the frame. How this is done will be understood by reference to Fig. 16, in which the block is shown in position at the bottom of the sash. By raising the sash the bottom of the block can be easily got out. In the event of a broken cord the




*Novelties.—Fig. 17.—Detail View of Fastener.*

block would be removed, the new cord passed down through the groove provided for the purpose in the edge of the sash, and finally knotted in the block, and the block returned. Among the advantages claimed may be mentioned the saving of time in putting in cords in window sash, and the fact that new cords can be put in place without removing the sash from the frames or in any way mutilating the paint or woodwork.

### Double-Grip Bit Brace.

The Upson & Hart Co., of Unionville, Conn., are introducing Armstrong's Double-Grip Bit Brace, illustrations of which are afforded in Figs. 17 and 18. The general view of the tool is shown in the first illustration, while a detail of the means of holding

*Fig. 18.—Armstrong's Double-Grip Bit Brace.*

the bit is shown in the second. The advantages claimed for this brace over others are that it exerts a double grip upon the bit, and thus overcomes the annoyance and delay occasioned by having a bit pull out or become loose in the chuck. In operating this brace the shell or sleeve is screwed down in the usual way, and then the cam lever shown in Fig. 19 is drawn up and closes the jaws firmly on the under side by the heavy pressure which it applies. It will thus be seen that it exerts a double grip upon the bit, and emphasis is laid by the manufacturers on the efficiency of its operation. It is described also as holding a round-shank drill so firmly as to save all annoyance from turning or loosen-

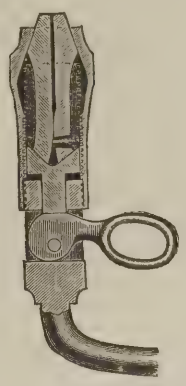


*Fig. 19.—Sectional View of Chuck.*

ing in the chuck. It is described as made from highly-polished steel and nickel-plated, the jaws being forged steel and hardened, and the shell which bears on the jaws as being also case-hardened, so as to prevent wear. The manufacturers put it on the market with confidence that it meets a want of the trade.

### Stuart's Window-Screen Frames.

E. C. Stearns & Co., Syracuse, N. Y., are manufacturing Stuart's Window-Screen Frames, which were patented October 13,

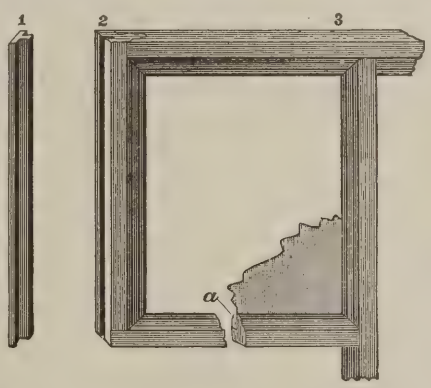



*Fig. 20.—Stuart's Window-Screen Frame.*

1885. Fig. 20 represents the appearance of the frame and the manner in which it is fitted to the window. This operation is accomplished by simply sliding the sticks along on each other to the required size, fastening by nail or screw, and sawing off the projecting ends. Fig. 21 gives a full-size sectional view of parts. It will be perceived that the corresponding numbers in the cuts indicate corresponding parts: 1 is the strip on which the frame slides; 2 is the side stick of frame; 3 is the cross stick of frame, and *a* shows bead which is tacked on over the wire cloth. The manufacturers call attention to the fact that the frame thus made is much cheaper and in appearance superior to those generally made by mechanics, and that it is capable of any desired adjustment, and insures close fitting and accurate joints. These frames are made in four sizes: No. 2, 36 x 36 inches; No. 3, 42 x 42 inches; No. 6, 48 x 48 inches, and No. 7, 54 x 54 inches.

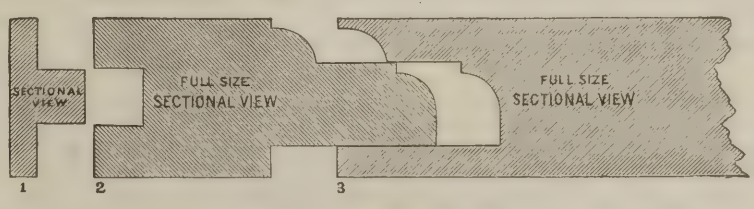



*Fig. 21.—Sectional View of Frame Shown in Preceding Cut.*

## House Painting.

The following general advice to carpenters with reference to the general plan of managing work we find in a recent issue of the *Painters' Magazine:*

It is very essential for the economy of time and labor, and the proper execution of house-painting jobs, that the painter should follow a methodical system of procedure. This system may be based on his own experience, aided by the best practice of others. The best course is to do his first work on the moldings, beads and edges of doors, architraves, panels and cornices. They may thus be treated rapidly and well. Next the stiles and surrounding work should engage attention. We have known painters who proceeded, being apparently incapable of proceeding continuously, but flying from one portion of the molded or plain surfaces to another, thus losing time, and gaining nothing to counterbalance the loss by erratic movements.

There is very considerable skill required in executing rapidly a neat job of sash painting. All good work on sashes tells on the general effect, while indifferent work will be certain to be conspicuous. Looking to the various styles of sash, no special directions can be given; the painter must trust in great part to his own ingenuity. If the colors to be used are left to his own judgment, he will, of course, take into account the color of the house, and either adopt some darker shade of same or some pleasingly contrasting color. Some years since a very common fashion was to adopt imitations of dark woods, but now the light-toned hues are in the ascendant.

For graining, oil colors which require a ground flat, or nearly so, are now almost universally adopted. In order to do good graining care should be taken to strain the colors, if not already prepared. This journal has supplied very ample information in respect to graining. Our readers, however, may as well have the benefit of the following general indications as to colors to be used, furnished by an English contemporary:

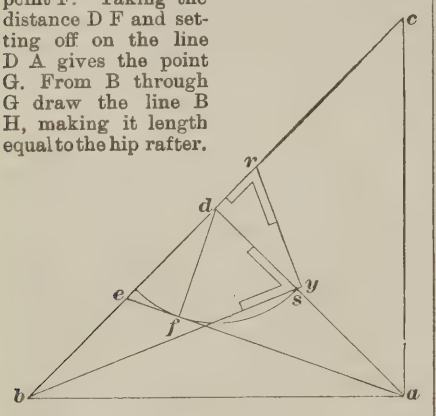
"The color for oak is to be tinted with good ground ocher and red; if for dark oak, to about the shade of salmon color; if for light, just a mere straining or tinting from white; cream white itself will do for a very light oak. For black walnut the ground is to be composed of white ocher and umber, to get the shade of the lightest parts of dry black-walnut wood. For mahogany get a deep orange color with ocher, white and red. For rosewood pure vermilion is the best, though a good brilliant may serve the purpose. For maple or satinwood, pure white, with a slight amount of chrome yellow; it is sometimes grained on pure white."

In repainting the exteriors of a house it is most advisable to commence operations with the higher and projecting parts. Whatever is commenced in the morning should, if possible, be finished in the same way. It will be found best not to commence a second coat or finishing until the first coat has been laid throughout the entire house. The finishing of the step floors should engage early attention, as well as outside blinds, if any, which, it is to be presumed, have been carefully numbered before being taken down. A careful painter will study to avoid laps, which are a positive disfigurement, discreditable to the painter, and will ordinarily show even under a number of coats of paint.

# CORRESPONDENCE.

### Hip Rafters.

*From* W. S. W., *Washington, Iowa.*—As this is always an interesting subject for carpenters, perhaps my contribution to *Carpentry and Building* will be acceptable. I have been much interested in reading the articles on hip rafters and hip framing that have appeared in the past. I will attempt to explain the method of finding the backing of hips. I say the method, for, although each one who has written on the subject has presented his method, yet when examined they are all one. Some use more lines than others, yet all are seeking one object, and all the methods depend upon the same general principles. The object in view is to represent a line drawn across the surface of a hip roof, square from the hip, and terminating with the plate, and showing what angle it will form with a line drawn square down from the hip to the seat of the hip. I read in Hodgson' little book on the "Steel Square" that to find the backing of hips it is necessary to "take the length of the hip on the blade and the rise of the roof on the tongue." Then the tongue gives the bevel. The author does not explain the reason. I will attempt to do it for him. Referring to the accompanying sketch, we have A B and A C as the plate lines of the roof. A D is the seat of the hip rafter; D E is the rise of the roof. Then A E will be the hip rafter. Squaring from the hip to the point D, establish the point F. Taking the distance D F and setting off on the line D A gives the point G. From B through G draw the line B H, making it length equal to the hip rafter.




*Hip Rafters.—Diagram with Communication from W. S. W.*

Square down from H to the line B C, thus locating the point I. H I will then be found to be equal to the rise of the roof. The bevel at G is the one that is found by all who have written on this subject. The bevel at I, however, is the same; hence all that we need to find it is a steel square and a straightedge. To make this more easily understood, take a piece of building paper and cut out the triangle A D F. Set it upon the line A D. Also cut out the triangle B H I and set it on the line B C, letting it lean against the other. Then the angle found at F will be seen to be a right angle.

### Decay of Roof Covering.

*From* C. J. H. W., *Boston, Mass.*—The decay of roof boards and the rusting through of tin roof covering is often due to other causes than those commonly considered The roof over an unused, and therefore cold, attic will frequently last much better than one made of the same material and placed over a building of which the upper story is occupied, and therefore heated, during cold weather. The air at the top of such a room is warm and contains much more water in suspension than the outside and cooler air which is in contact with the upper surface of the roof. This warm air penetrates the cracks of the roof boards, and deposits moisture under the roof covering, and as a result decay of wood and the rusting of the metal are sure to follow. Such instances are more noticeable where there is a double roof covering separated from the first course of plank by furring. The assumption that an air space is a better non-conductor of heat than solid wood is a fallacy which has been exploded by every careful experimenter upon the subject of conductivity. It would be better to have a second course of boards laid on the first course, carefully breaking joints. The value of tarred paper in roof construction is increased by seasoning for a period of six months or more; during this time the volatile products of the distillation of coal tar will pass away. Manila paper is often laid over tarred paper before the roof covering is applied, and in many instances manila paper is preferred to tar paper under roof coverings.

### Cistern Building.

*From* P. H. L, *Port Townsend, Wash. Ter.*—I take the liberty of answering a question proposed by "W. S. S." in a recent number of *Carpentry and Building.* Although I am a builder and contractor by trade, I have occasion to build a great many cisterns, and hence my experience may be of some benefit to the inquirer. After the arch is built it is covered with a mixture consisting of one part Portland cement and three parts sand. When this is set it will prevent the water from filtering through the arch from the top. The same mixture is used for plastering the walls. When dry a brush coat is applied by taking a half-bucketful of cement to a half-bucketful of water, the mixture being kept stirred while it is being used. If the cistern is allowed to dry for a few days before the water is put in a good job will be made. If this brief letter does not fully meet the requirements of your correspondent, or the readers of *Carpentry and Building* generally, I shall be glad to write further in answer to any questions that may be proposed. I think "S. L. M." is somewhat off his base when he gives the advice to lay brick in a cistern without mortar. Under such conditions I would expect the walls to cave in, especially if the cistern were dug in a sandy soil. Further, I think that your correspondent uses too large a proportion of cement. One barrel of Portland cement is sufficient for a cistern of 200 barrels capacity.

### Splayed Jambs.

*From* J. D. W., *Passaic, N. J.*—I acknowledge the benefit *Carpentry and Building* has been to me in the past, and at the same time announce my intention to continue to be the recipient of its valuable instruction in the future. I beg to inquire for further information on the subject of splayed jambs. I refer to the article on pages 232 and 233 of the issue for December, 1885. I cannot understand why the line C 1 in the plan, Fig. 3, is developed to give the stretchout of the head of the frame, shown by K G in the elevation, Fig. 2. The system of triangulation is new to me, and I hope it will be further illustrated in the discussion of this and similar problems.

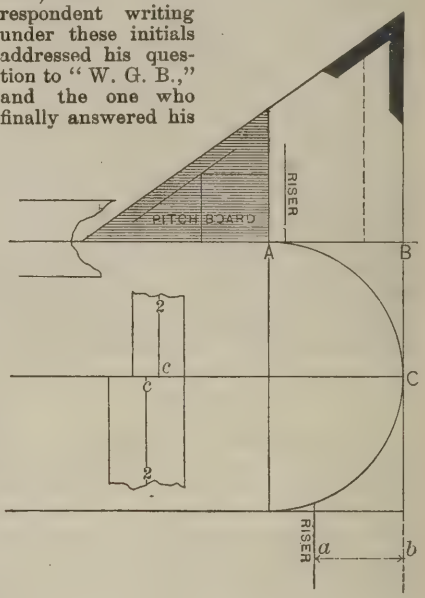
*Answer.*—The development of the outer curve and also the development of the inner curve of the head in the problem in question were essential in order to furnish the correct length of the inner and outer edges of the pattern-piece. A stretchout taken from the elevation, as shown in Fig. 3, would not be any longer than the length of the same line occuring in a flat wall. The wall in this case being curved or bent, a greater length is necessary to reach from point to point. What we really did was to find the space covered by the curves in question when laid down flat. The use that we made of the developed curves in delineating the pattern we would suppose would serve to answer our correspondent's question. If he will read the demonstration through again, with this idea in mind, we have no doubt that he will understand it fully.

### Bad Acoustics.

*From* S. F. B., *Wellington, Ohio.*—If your correspondent, "M. B. P.," of Lincoln, Ill., who inquires in the November number for a remedy for bad acoustics, will take fine wire and stretch across the center of the church, at the top of the side walls, and will place a second and third wire on the two sides of it respectively, say 10 feet away, and then stretch other wires diagonally from the opposite corners of the room, so that they will form an X in the center, drawing the wires tight, I think the difficulty will be overcome. I know of two halls which were very bad and which were remedied by the plan I have suggested.

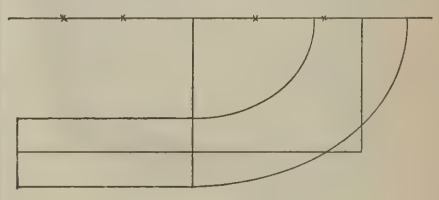
### A Problem in Hand-Railing.

*From* W. G. P., *Toronto, Ont.*—With the Editor's permission, I would like to answer a question asked in the March number for last year by "W. W. P.," of East Fairfield, Ohio. The correspondent writing under these initials addressed his question to "W. G. B.," and the one who finally answered his




*A Problem in Hand-Railing.—Diagram Submitted by W. G. P.*

question was "W. B. G.," and now I, with initials "W. G. P.," will contribute my share to the discussion. My attention has been called to the matter because several have pronounced "W. B. G.'s" answer incorrect. Without questioning the correctness of "W. B. G.," I may say the method I adopt does not locate the risers in the same position as "W. B. G.'s. I will take the same sized well as laid down by "W. B. G.," so your readers can compare them. In working from the center of planks simply locate your riser landing and your riser starting just one-half the base of pitch-board, or in other words just half a thread from the back tangent, as shown at *a b* on plan. In working from the top side of plank at the shank end, and at the center at the upper end, causes the riser to be brought forward—just how much depends on the thickness of plank you use. To explain this I will adopt the same sized rail and the same thickness of plank as laid



*Pattern of Wreath-Piece.*

down by "W. B. G." It could be shown in many ways, but I think none more simple than the one shown in the April number of *Carpentry and Building* for 1882. No elevation is required; you simply lay down your plan of center line of rail, with its tangents and springing line; next draw thickness of rail and the thickness of plank out of which your wreath-piece is cut, and draw center line down each, as shown at 2 and marked *c*; take this distance from *c* to *c*—that is, from the center of one piece to the center of the other—and run it down from the top edge of pitch-board, as shown; next set up half a riser on the riser edge of pitch-board, and square it over to cut the other line just drawn, from where it cuts the line; square the line as shown down to

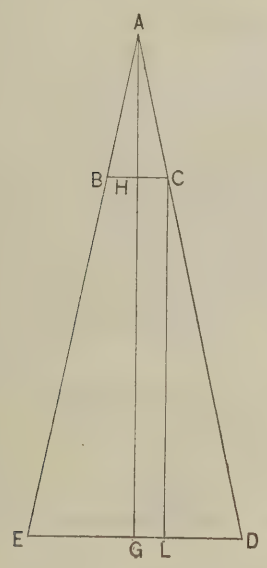
bare edge of pitch-board; place this line on tangent B C, and the point of pitch-board gives you position of riser starting and landing.

Now for face-mold; first extend tangent B C to the left; do same with springing line; draw pitch line across the two from pitch-board. This gives length of pitch tangent set of half-width of rail from point B, and draw up to cut pitch, which gives half-width of mold at wide end, the other tangent, being level, is, of course, same length as on plan; now strike mold on piece of thin stuff, as shown. The riser on the right is in position right for working from center of plank. The one on the left is right when working from top side of plank. Now suppose the risers had been placed at the springing, which is usually done by a carpenter when the rail is left to the hand-railer; in that case apply method laid down by me in *Carpentry and Building*, March number, 1885, page 57. Very small wells I treat differ ently.

### Measurement of Tapering Timber.

*From* G. W. S., *Detroit, Mich.*—At the risk of making the subject tiresome, I send an article on "Tapering Timber":

Let B C D E be a vertical section of the stick in question, and complete the figure by




*Measurement of Tapering Timber.—Diagram from G. W. S.*

producing E B and D C to meet in A; also draw A H G perpendicular to E D and C L parallel to the same.

Then by the properties of triangles,

D G : G A = C H : H A; or as
C L = G H, D L : L C = C H : H A.
C H = 3 inches, D L = 6 inches,
L C = 12 feet.

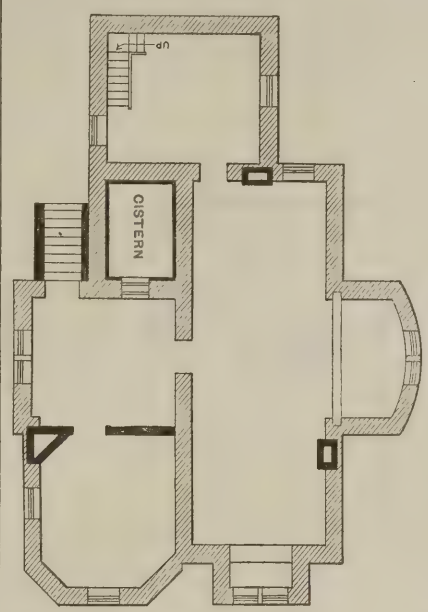
0.5 foot : 12 feet = 0.25 foot : 6 feet.

Therefore A G = 12 + 6 = 18. We now have a pyramid whose base is 18 inches square and 18 feet high, and whose solidity is 13.5 cubic feet; also a smaller pyramid whose base is 6 inches square and 6 feet high, and whose solidity is 0.5 cubic foot

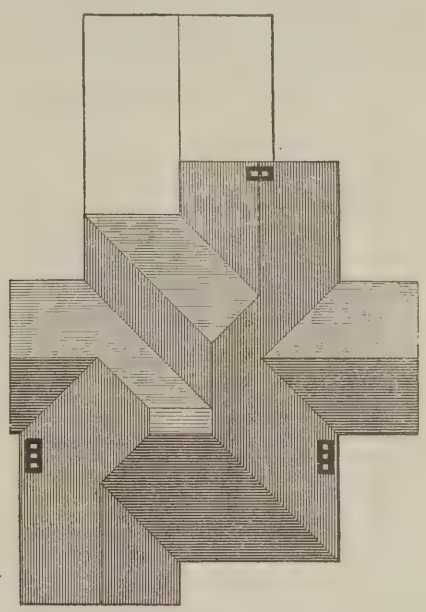
Take pyramid A B C from pyramid A E D, and remainder = frustum B C D E, the stick in question, or 13.5 cubic feet − 0.5 cubic foot = 13 cubic feet = 156 square feet. This may be relied on as the absolutely correct answer to the question. The prismoidal formula is generally correct in such questions, but sometimes fails in cases of figures of many sides to be perfectly correct. As to the other methods given by your readers, they are not reliable. As to the various cuttings and slicings made use of, if we wish to cut and carve the figure we can suppose it to be made up of an infinite number of solids, whose bases are squares and whose hights in the aggregate amount to the hight of the figure. The solids differ by an infinitely small amount, but in their total form the tapering stick and the determination of the amount is a problem in the integral calculus. The rule for finding the solidity of the pyramid is given by the principles of solid geometry, and is true unless all mathematics are false.

### Floor Plans.

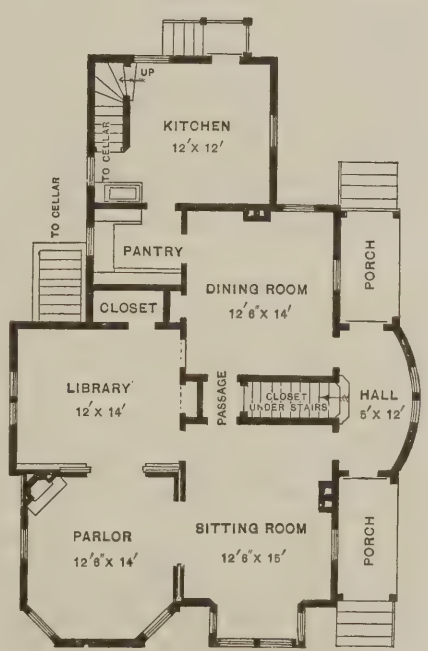
*From* C. L. GRAHAM, *Burlington, Wis.*—Referring to the floor plans sent you a short time since, and which were published in the March number, I send you a modified arrangement which may be of interest to your readers.



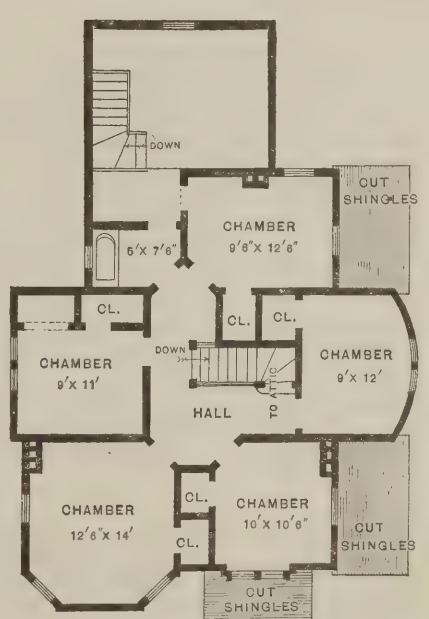

Foundation.



Roof.




First Floor.




Second Floor.

*Floors Plans Submitted by C. L. Graham.—Scale, $\frac{1}{16}$ Inch to the Foot.*

*Note.*—The set of plans submitted by Mr. Graham and published in our March number have attracted so much attention among our readers that it gives us pleasure to submit the modified set referred to in the above letter herewith. The changes are not very radical, and yet they are such as to make the arrangement still more desirable in the estimation of many householders. The portion of the side wall immediately in front of the stairs, it will be seen, is made curved in form. The corners of the front, where the parlor is located, are cut, thus breaking up the line of the elevation somewhat. A double sliding door is placed between this room and the library. To those who are fond of giving receptions the space that can be obtained by this arrangement of rooms will be greatly appreciated. It will be noticed that in this set of plans an additional chamber is provided and also back stairs. In this connection we would present the following letter from a prominent builder:

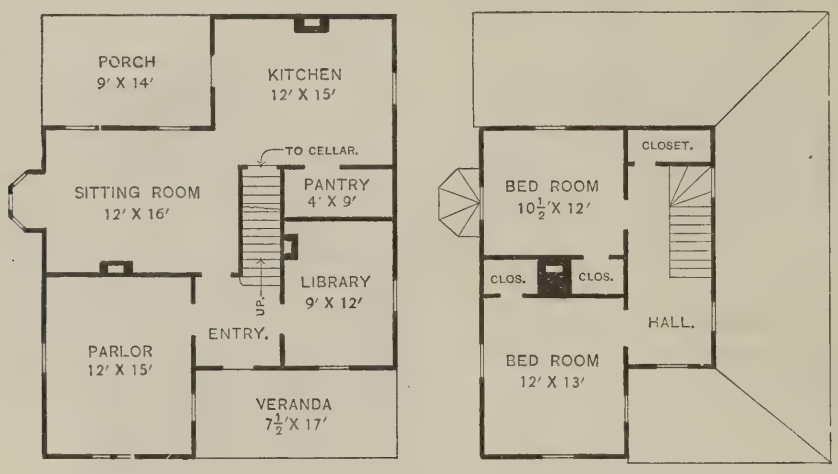
*From* B. U. T, *Eldred, Pa.*—I desire to offer a word of praise for the set of plans published in the March number from Mr. C. L. Graham, of Wisconsin. In my estimation they show the best arrangement I have examined for a long time. I have submitted them to a number of my friends, and after inspection they have pronounced them good. There is an economical neatness about the whole plan not often seen.

### Glass Sash Pulleys.

*From* L. S. H., *Boliver, N. Y*—Glass window pulleys were in use as far back as 1867, in South Berwick, Me. They were employed by W. A. McIntyre, with whom I was at that time serving my apprenticeship. They were manufactured exclusively by the American Glass Window Pulley Co., and were furnished to the trade by B. D. Washburn, No. 137 Congress street, Boston. The pulleys referred to I do not think were identical with those mentioned by other correspondents of *Carpentry and Building;* hence I give what information is in my power. I fear, however, that it will be of very little benefit to the correspondent inquiring.

### Plan of Farmhouse.

*From* M. J. W., *Abington, Ind.*—I inclose you some farmhouse plans to add to the large assortment that has already been published in *Carpentry and Building*. Should any one be willing to draw elevations of this plan I should be very glad to see them in the paper. The aim in designing the house represented herewith has been to secure a plan showing four rooms on the first floor and two on the second. The first floor contains a parlor, sitting-room, kitchen and bedroom, together with pantry, porch, veranda and vestibule. They are so arranged as to make communication from the kitchen to the pantry and cellar possible without the necessity of passing through another room.




*Farmhouse Plans by M. J. W.—Scale, $\frac{1}{16}$ Inch to the Foot.*

### Shingling Valleys.

*From* T. A. H., *Vineyard Haven, Mass.*—I have been a constant, but silent, reader of *Carpentry and Building* for a long time. After reading the question asked by "J. M." in the November number, I thought I would submit my method of shingling valleys. I suggest to your correspondent that he cut his tin or zinc into pieces 9 inches square, and bend them cornerways to fit the angle of the roof. Lay one of these pieces of metal with every course of shingles, putting one nail in each right and left hand corner to hold it from slipping. Fit the shingles tight together over it and do the work carefully in all respects. By this construction the inquirer will secure a valley that will be tight, and one that will last as long as the shingles. I think that one-fourth pitch is flat enough where shingles are employed if a tight roof is desired.

### Removing Oil Stains from Granite.

*From* H. C. H, *York, Pa.*—I would be glad to learn, through *Carpentry and Building*, what will take grease or oil out of a granite door stoop.

*Answer.*—Grease or oil may be removed from stone steps or walks by pouring strong soda and water, boiling hot, over the spot, and then laying on a little fuller's earth made into a thin paste with boiling water. Let it remain over night, and, if the grease be not removed, repeat the process. Grease may sometimes be taken out of stone by rubbing the spot with a hard stone, using sand with very hot water with soap and soda. We have not had experience with granite, and cannot say that either of these methods is applicable in the specified case to which our correspondent refers. We should have no hesitation in trying them, however.

### Pitched Treads.

*From* C. P. B., *Claremont, N. H.*—A short time since the builder for whom I am working set me to put up some stairs, and told me to pitch them ⅛ inch lower than level. The idea is new to me, and, being one of those who desire to live and learn, I submit the question to the practical stair-builders among the readers of *Carpentry and Building*. In learning my trade I was taught to place stair treads level both ways.

*Note.*—The question suggested by this correspondent is one which perhaps can be profitably considered by our readers. Unfortunately the writer of the letter does not give as many particulars as might be desired. He leaves us in doubt whether the stairs in question are inside or outside stairs. If they are outside stairs the pitching referred to would probably be for the purpose of throwing off the water and thus avoiding the danger of ice forming on the steps. He fails to give the width of tread. A pitch of ⅛ inch in a narrow tread would be a far more serious matter than a pitch of the same amount in a wide tread. We see no very good reason for pitching treads at all except to cause water to run off. Even then—under some circumstances, at least—it would seem to be a matter of doubtful expediency. Many a severe fall is experienced on stairs, and a pitched tread might be the means of throwing a pedestrian off his feet as successfully as a tread having ice upon it. We shall be glad to receive expressions of opinion from our practical readers.

### Cheap Ceiling.

*From* G. W. S., *Greenville, Miss.*—How would canvas answer in a cheap building for a ceiling? The plan I have in mind is about as follows: Strips of wood would be nailed to the rafters the width of the cloth, and the cloth tacked to the strips. A neat molding would be nailed over the joints. Finally, the cloth would be washed with one or two coats of alabastine. Would building paper be more satisfactory to use in the same general manner?

*Answer.*—A ceiling constructed in the general way our correspondent describes might answer a very good purpose, so far as cheapness alone is concerned. We should not expect anything very elegant in appearance, nor any great durability. In short, it has very little but cheapness to recommend it. Building paper might answer a fair purpose also, although, on account of its tendency to warp and buckle with changes in the atmosphere, we are inclined to favor the canvas. Coating with alabastine would probably make as desirable a finish as could be put upon this kind of foundation.

### Excluding Flies and Other Insects.

*From* C. K. N., *Orlando, Fla.*—I venture to call the attention of readers of *Carpentry and Building* to the want which exists in this warm climate for a contrivance which can be applied to casement windows to keep out flies or insects. The ordinary screen doors will not answer, because shutters or blinds almost always accompany the casement windows to exclude direct sunlight; nor would a vertical sliding screen suffice, for obvious reasons. If manufacturers could supply a roller to which flexible wire cloth might be attached, I think it would be a satisfactory arrangement for the purpose. If you know of any article of hardware in the trade which is applicable, as explained above, I will be greatly obliged for a reply through the "Correspondence" column of the paper. I believe that you will benefit other subscribers as well as myself. I do not consider my request as purely personal.

*Answer.*—We do not know of a screen of wire that works upon rollers, but one was illustrated among our "Novelties" some time since, of other material than wire, which operates upon a spring roller, that we think would answer a desirable purpose for such positions as our correspondent names. We refer this correspondent to the description of the rolling window screen published on page 53 of our March issue for last year. The article is manufactured by the Benedict Rolling Window Screen Co., of Asbury Park, N. J.

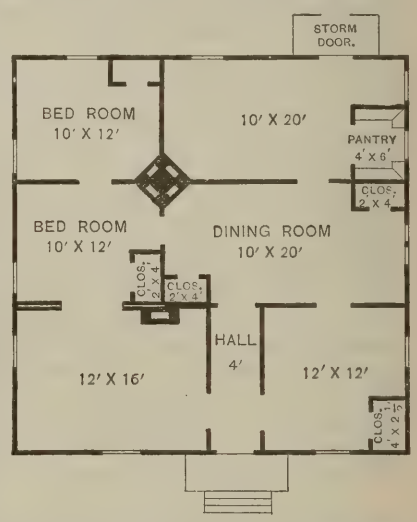
### Frozen Mortar.

*From* B. U. T., *Edred, Pa.*—I would say to "G. B.," Superior, Neb., to let his mortar thaw out in the natural way and not to be afraid to use it. I have had mortar frozen many times, and after it has thawed out have used it as though nothing had occurred, and I have never had any trouble with it.

*Note.*—The advice is directly opposed to that offered by other correspondents in the past when this question has been up, as well as in letters recently received.

### Hexagonal House Plans.

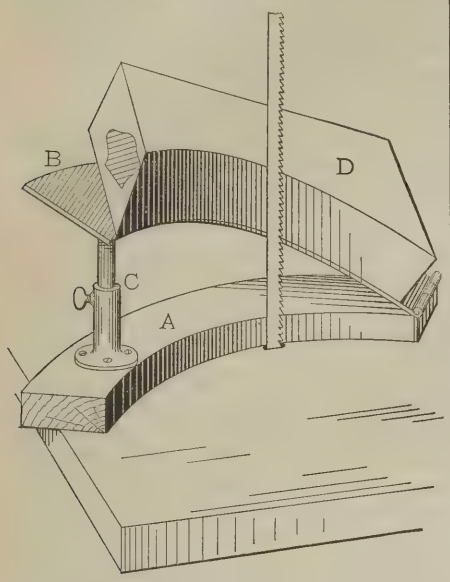
*From* I. G. L., *Danville, Ill.*—On page 33 of the current volume of *Carpentry and Building* your correspondent "S. W. H." shows a plan of a house containing hexagonal rooms which he says has given great satisfaction. He continues: "I would be glad to see a plan containing the same number of rooms built with so small a lumber bill and as little masonry, and having altogether as good light and ventilation, as the plan submitted." In the way of comment on these plans I would ask, Is there not too much light in summer and too much ventilation in winter? One-half to three-quarters of the space of each room has outside walls. There is also an outside door to each room on the ground floor, and there is no indication of storm doors for protection. The ground floor of the plan, as I calculated, measures about 970 square feet, angles included. The outside walls are 133 feet in circumference. The square of 133 feet—say 33 feet to the side—would inclose 1089 square feet, or 119 feet more than the hexagonal, giving about as much available space on one floor as is contained in the first and second floors of the hexagonal building. I inclose a plan of arrangement of rooms for a one story house to be covered by a hipped roof. The outside walls are 33 feet in length. Six rooms and a passageway are shown, and the whole is an arrangement which I think any experienced builder would contract to finish at a less figure than he would undertake the hexagonal plan, using like materils. As to comfort, convenience and labor required to keep in order, let others decide.




*Hexagonal House Plan.—Arrangement of Rectangular Plan, Suggested by I. G. L.*

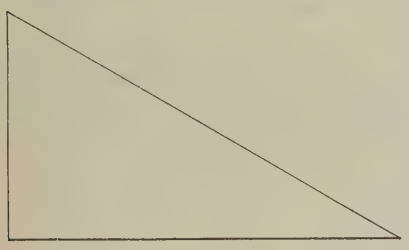
### Cutting Out Wreath-Pieces.

*From* S. W. J., *Richmond, Ind.*—I inclose some sketches representing my plan for cutting out wreath-pieces for hand-rails. The sawing, as it will be seen, is done by a band sawing machine. The quarter-circle A, Fig.



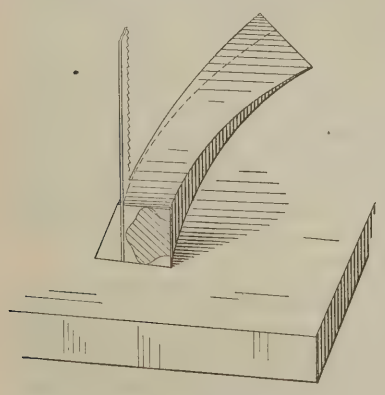

*Cutting Out Wreath-Pieces.—Diagram with Letter from S W. J.*

1, represents a piece of wood ⅞ inch thick, cut so that the inside diameter corresponds in size with the inside diameter of the wreath-piece. It is of a width to suit the hand-rail. In sawing the rail out the saw blade is made to follow the circles of the gauge-piece A. B represents a piece of sheet iron cut to a quarter-circle, and not



*Pitch-Board Used in Setting Gauge.*

over 2½ inches wide, and hinged at one end to the gauge-piece A. By this means B can be moved up and down to suit the pitch of the stairs, and its position is ascertained by placing the pitch-board in position. C represents an upright tube in which is a loose piece which can be moved up and down and can be fastened by means of a thumb-screw



*Position of Work During the Second Cut.*

at any desired hight. D represents the plank in position, showing one cut taken off. After having taken off the opposite side of the plank, the piece E, which is a piece of tin in size and shape corresponding with the pitch-board, must be placed on the inner side of the plank; then pressing it in to suit the concave surface, a line is drawn with a pencil along its top edge. By this means the lines for the cuts which are represented being made in F, Fig. 3, are obtained. Use a thumb-gauge to get the thickness of the rail. After having produced the first piece proceed with the other pieces in the same way. All cuts can be made while the plank is in position. The different turns in hand-rails can be obtained by reversing the sheet-iron plate and hinging it on the opposite end of the piece A. In this case the standard C would also have to be transferred. The plank is secured in place by means of screws through the plate into its under side. By this means a great deal of hard work is avoided and many complicated lines are saved.

*Note.*—Perhaps our readers will understand this explanation of the means of producing a wreath-piece in hand-rail work better than we do, but we are at a loss to understand how the piece of sheet iron indicated by B, in Fig. 1, which by the specification is cut to a quarter-circle, can be hinged at one end and raised at the other end, more or less, according to the conditions under which the work is being made, and fulfill the purpose described. We have attempted to present our correspondent's ideas just as they reach us, and shall be glad to have the comments of our practical readers upon his method of work.

### Contents of Tapering Timber.

*From* S. T. P., *Tacony, Pa.*—I have noticed a discussion concerning methods of calculating the contents of tapering sticks of timber published in *Carpentry and Building*. I take the liberty of submitting the rule by which any any tapered strip or anything in the shape of a prismoid, can be measured. For example: What are the contents of a stick of timber measuring 6 x 6 at small end and 18 x 18 inches at large end, and 12 feet long. First, obtain the area of the ends in inches and add the amounts together, thus: $6 \times 6 = 36$, and $18 \times 18 = 324$. The sum of this, that is, $36 + 324 = 360$ square inches, the area of the two ends. We next obtain what I call "the sum of the breadths," as follows: thus, $6 + 18 = 24$, and $6 + 18 = 24$; multiplying these together, that is, $24 \times 24 = 576$. To this amount add the area of ends, $576 + 360 = 936$. Multiply this by one-sixth of the hight, which would be 2. Thus, $936 \times 2 = 1872$. Dividing this by 12, to reduce to feet, gives 156, the contents of the timber in question in board measure.

### Wooden Brace.

*From* A. J. B.—In answer to "A. S.," of Greenbay, I would say that the brace he inquires about is an imported article. It is known as the "Scotch brace and bit." I have one I purchased some 12 months since, and, although I am using the best of modern tools, I would not be without this article for twice its cost, which was about $10. The brace is of beach and rosewood, beautifully trimmed with brass, and is light and strong. With it is a set of 40 bits, comprising center, spoon, pod and lip and gimlet bit, reamer and countersinks for wood, brass and iron, screw-drivers, &c., all of excellent make and finish. The bits are perfectly, fitted, and, being held up by a thumb-spring, are much quicker put in and out than is possible with the iron brace. I esteem this article as one of the handiest tools in my kit for light work, such as fitting locks and other trimmings. I would be glad to get on the track of this tool again, for I desire to purchase another one. I feel confident that few mechanics would be without it if once acquainted with it.

### Building Association Problem.

*From* J. L., *Mankato, Minn.*—Referring to the building association problem published in the June number of last year, I would say that if simple interest is intended—that is, if the principal is all to be paid before any of the interest—I think the following solution will be found correct: There is $1000 at interest for the first month; there is $940 at interest the second, and $880 the third month, and so on until $40, the last payment on the principal, is made at the end of the seventeenth month. Adding these 17 amounts together gives $8840, which represents the number of dollars on interest for 1 month. Dividing $200, the amount of interest, by the interest on this sum at 1 per cent. gives 2.26 + the monthly rate required.

*Note.*—The above answer to the building association problem reaches us long after other replies have been published We commend it to the attention of those who have given this subject consideration, trusting that they will make such reply to it and comments upon the method suggested as may be appropriate under the circumstances.

## TRADE NOTES

THE SEVENTEENTH COMPETITION conducted by *Carpentry and Building* is still open, the date for closing being May 5. This contest is exciting considerable interest and is likely to produce results which will be of great value to our readers. Circulars containing full particulars will be mailed to any address upon application to this office. Particulars will also be found in the March number of this journal.

WE HAVE RECEIVED from A. J. Bicknell, secretary of the Builders' and Manufacturers' Mutual Benefit Association of America, with office at No. 239 Broadway, New York, a copy of a circular recently issued. In the Board of Trustees holding office for the present year we notice some new names, among which may be mentioned Wm. B. Daland, with Hackett, Carhart & Co., clothiers, 418 Broadway, New York; Elijah P. Leonard, of S. B. Althause & Co., Architectural Iron Works, 101 Thompson street, New York, and John G. Bogart, of A. G. Bogart & Bro., carpenters and builders, 113 Bank street, New York.

FRED ADEE & CO., of 52 Cliff street, New York, among other new plumbing goods, have just brought out Hyde's patent extension water-closet and urinal. A handsome circular has been prepared illustrating the apparatus by general views and sectional drawings. The water-closet may be arranged to operate automatically or otherwise, as may be desired. Any number of closets placed in different parts of a building may be controlled by one stop-cock located where most convenient.

UNDER DATE of March 1 the S. A. Woods Machine Co. issued the following circular, which has interest for all purchasers of wood-working machinery: "It has come to our notice that certain manufacturers of planing and molding machines are making and selling machines that contain patented improvements which are owned by us exclusively, and we desire to caution users of wood-working machinery against buying or using machines that infringe our patents. Particularly do we call attention to 'fast-feed' planers and heavy molders that closely resemble our own well known machines in general appearance, for they so far employ and embody our patented devices that we have been compelled to insist upon an immediate discontinuance of several features therein used. We have given no license for their use, and any one making or using such machines does so at his own risk. Our machines have been perfected by many years' experience, and are so well and favorably known as to invite imitation from manufacturers who would seek to profit by the well-earned reputation of our machines, but when it comes to direct infringement we most emphatically object, and shall seek to protect our rights in this matter. Believing that millmen generally, among whom we are known to some extent, will understand the justice of our claims, we remain yours obediently, S. A. WOODS MACHINE CO."

THE ILLUSTRATED CATALOGUE of water-closets and other plumbing goods recently issued by the Myers Sanitary Depot, No. 54 Beekman street, New York, is deserving of more than passing notice. It is in pamphlet form, large octavo size, and has 128 pages. It is handsomely printed on heavy calendered paper, and the illustrations are among the best of their class. The catalogue illustrates a very complete line of valve and cistern side-

outlet closets, back-outlet washout closets, front-outlet washout closets, square-top back-outlet washout closets, Dececo syphon closets, &c. A number of McFarland's specialties are shown, including his automatic dumping flush tank, and his nickel-plated automatic syphon tanks. Dececo sinks with flush pots are shown, and are said to be very effective in preventing the accumulation of grease in the waste-pipes, thus avoiding the frequent stoppages and consequent annoyance and expense. A line of Stebbins's compression work in solid silver metal is also presented. Broughton's self-closing bibbs are shown. Many specialties, including some novelties, are presented, all of which will attract attention.

CHARLES P. FAY, of Springfield, Mass., presents in his card, in another part of this issue, illustrations of his spring calipers and dividers, with statement of advantages. Among these may be mentioned rapid adjustment, interchangeability of parts and evenness of tension.

IN ANOTHER PART of this issue the Gilbert Lock Co., Newark, N. J., direct attention to rotating door-knob furniture which they are manufacturing, and which is pronounced entirely new. This style of door trimmings, the trade is informed, has the advantages of no screws in the shank to work loose, and the absence of hub and spindle. Catalogues are sent upon application.

A NEW CATALOGUE has been issued by the Sagendorph Iron Roofing and Corrugating Co., of Cincinnati. The various departments of the business conducted by this company are described in detail. We have space only to mention them by name. The first is devoted to pressed standing-seam iron roofing, the second to corrugated iron, the third to V-crimped iron roofing, the fourth to roll-cap iron roofing, the fifth to sheet-metal clapboarding, the sixth to flexible canvas and duck roofing, and the seventh to Obelisk metallic paint and cement.

THE CINCINNATI MOLDING CO., No. 375 West Third street, invite architects and builders to send for their catalogue containing over 100 designs of carved moldings suitable for inside finish and for furniture. These goods are machine-made and possess features never before presented in machine-made goods.

FOR THE SPRING TRADE several new articles of interest to architects and builders are to be announced. Among these may be mentioned new patterns and styles of sheet-metal shingles, some of them by new concerns engaging in this line of business. Among the important additions to the assortment from which selections may be made are new goods brought out by J. S. Thorn, 1201 Callowhill street, Philadelphia. Mr. Thorn has devised a shingle which, while possessing all necessary constructive features, is also architectural in appearance. It has the important advantages of covering well and being applied with a small amount of labor; at the same time it is as attractive when in place as the modern patterns of tile and cut patterns of slate. This line of goods, which we hope to fully illustrate in an early number, is of special interest to builders.

THE WARREN EHRET ROOFING CO., of Philadelphia, direct the attention of our readers to their line of building papers, including manila and rosin-sized papers, deadening felt, carpet linings, &c. They also describe their general line of roofing materials.

EARLY IN MARCH the extensive sheet-metal working establishment of Bakewell & Mullins, located at Salem, Ohio, was partially destroyed by fire. While the damage was sufficient to interrupt business, the firm were able to make temporary arrangements, so that work could be resumed in a short time after the fire. Permanent buildings are now in progress of erection, which we are informed will more than double the capacity of the concern. Orders, we understand, are now being filled promptly.

THE ANGLO-AMERICAN ROOFING CO., 22 Cliff street, New York, in their card in another column, announce their circular for the present season containing different designs of roof covering of their manufacture. These shingles are made in tin and copper and kalameined iron. Agencies have been established at St. Louis, Mo., and at Denver, Col.

EDWIN A. JACKSON & BRO. have just issued a new edition of their catalogue of heat-saving and ventilating grates. The office of the firm is at No. 77 Beekman street, New York. The catalogue, which is a very dainty as well as handsome piece of typography, is oblong in shape and contains 51 attractive plates in addition to several woodcuts, the latter supplementing directions for setting mantels. The plates contain illustrations, with letter-press descriptions, of the Jackson ventilating grate of various patterns and styles. This apparatus, which has been before the public for a number of years, is well known to our readers and has made a host of friends during the time it has been in use. It possesses all the advantages of an ordinary grate with important additions. The book is of special interest to architects and all who are concerned in the erection of buildings in which apparatus of this kind is desirable. A number of new patterns and styles of finish have recently been added, which are shown. A number of pages at the close of the work are devoted to testimonials from prominent men who have used this apparatus. They are arranged with reference to their geographical location and are also numbered. An index accompanies the testimonials, referring to them by number, as they treat upon leading questions which arise in the minds of those who are about to purchase grates. No less than 239 testimonials are thus laid before the public in a remarkably practical manner. The arrangement is unique, and we are certain it will be appreciated.

THE GLOBE IRON ROOFING CO., of Cincinnati, have favored us with copies of circulars recently issued showing their manufactures. The Globe standard roofing is illustrated in detail, with examples of its application. Corrugated roofing is also referred to, and diagrams are included showing how buildings are to be measured in ordering roofing.

THE DANVILLE NAIL AND MFG. CO., of Danville, Pa., have sent us a pamphlet devoted to a description of their goods, and more particularly to the explanation of a telegraphic code intended to facilitate orders for nails, spikes, &c., by wire. The code has been very carefully considered, and seems to provide means for asking almost any question that might be required in the nail trade, as well as ordering goods of every description at stipulated prices.

THE NEW EDITION of the pamphlet entitled "Our Homes, How to Heat and Ventilate Them," issued by the Smith & Anthony Stove Co., Boston, Mass., is more attractive than any number that they have previously put out. It is a square pamphlet of about 100 pages, with handsome cover lithographed in colors. The pages within the book are illustrated by views of numerous residences situated in New England and other portions of the country in which some of the apparatus manufactured by this firm may be found. Various methods of heating are considered, thus furnishing much valuable material to those who are studying the question of heating. Ventilation is also discussed. A number of illustrations of apparatus of their manufacture are presented, with tables giving the dimensions, capacity, &c.

THE PENNSYLVANIA GLOBE GASLIGHT CO., with office at No. 47 North Second street, Philadelphia, direct the attention of architects and builders to their gas machines, plain and fancy lamps for house and factory use, and also to their facilities for erecting gas and water works.

WE HAVE RECEIVED from J. W. Bailey & Sons, 14 Charlestown street, Boston, Mass., their catalogue for carpenters and builders. It is a small pamphlet of about 70 pages, in which many articles are illustrated that are of interest to the building trades. Moldings are shown in profile, with prices, also corner blocks for inside finish, with mention of rope moldings, marbleized wood for shelving, wooden gutters and other specialties. Pine fence-pickets are shown in a variety of styles, as also are sawn balustrades and balcony-work. A considerable assortment of hood brackets is presented, hand-rails are illustrated, and a number of designs of fancy turned balusters and newel posts are shown. Wood mantels are illustrated by several pages of engravings. The present issue takes the place of former editions and will be found a desirable addition to the library of trade publications of carpenters and builders wherever situated.

EMIL LENZ, No. 54 West Twenty-second street, New York, announces the American agency for the Stettin Portland Cement Works, "Merkur," Stettin, Germany. Mr. Lenz solicits correspondence with contractors and builders with reference to space which he controls.

THE LOUISVILLE MANTEL AND CASKET CO., of Louisville, Ky., direct the attention of our readers to their line of slate and iron mantels and grates. They announce an illustrated catalogue and price list to be sent on application.

MESSRS. CHARLES A. STRELINGER & CO., of Detroit, Mich., inform us that their specialties, to which the attention of our readers has been called by their advertisements, have built them up a very large trade throughout all parts of the country through the medium of correspondence. Strange as it may seem, we learn of goods that they have sent from Detroit into New York City and other places in the East. While the eastern country, the New England States in particular, manufacture many of the specialties in which this firm deal, mechanics generally fail to have their attention called to them, even though residing in the immediate neighborhood where they are produced. Hence it is that such anomalies occur as sending tools from Detroit to Bridgeport, Conn., and into towns throughout the State of Massachusetts. The design of Messrs. Strelinger & Co. is to keep the very best tools of their kinds, and to acquaint intending purchasers of their merits by carefully prepared catalogues.

THE NATIONAL SHEET METAL ROOFING CO., No. 518 East Twentieth street, New York, have added several new specialties to their already extensive line of manufactures. Among these may be mentioned Cusack's metallic siding, and also a new article in the way of ceiling finish. A new catalogue is ready, and it, with miniature samples, is sent on application to any address.

THE HOPSON & CHAPIN MFG. CO., New London, Conn., have issued a little pamphlet entitled "House Heating by Hot-Water Circulation," in which they refer to the advantages of this system of heating, and describe briefly the Pequot boiler, which they manufacture. The pamphlet states that hot-water heating is more healthy than either steam or hot-air furnace, this conclusion being reached by observing the effects of air heated by these several systems upon plant life. Among the causes which have prevented the more extensive use of hot-water heating are mentioned the high first cost and the imperfect way in which the system has been applied. The fact that in Canada hot water is the common method of heating is referred to as a decided point in favor of the system, as the severity of the Canadian winters makes it necessary to employ the most efficient means of heating. The general get-up of the pamphlet is very tasteful, and the observations it contains on hot-water heating are both instructive and entertaining.

THE RICHMOND WEATHER STRIP CO, 217 North Sixth street, Richmond, Ind., present in another portion of this issue illustrations of their Perfection strip as applied in different positions, together with a list of State agents. This article was awarded a medal at the Cincinnati Industrial Exposition.

MESSRS. ELLISON & FEIGEL, of Allegheny, Pa., to whose laundry table the attention of our readers has already been directed, have recently removed to new and more commodious quarters. They are now located at No. 38 South Diamond street, in that city, and have manufacturing facilities commensurate with their rapidly increasing trade. The laundry table has been patented in Canada.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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## NOTES AND COMMENTS.

AT THE time we went to press with our April number we were disposed to entertain a very hopeful view of the building prospect throughout the country. Notwithstanding the apparent conflict between labor and capital, it seemed that difficulties would be avoided and differences so far adjusted as to insure a season of unwonted activity. Before the paper reached our readers, however, it became evident that the wise councils of the leaders of the labor organizations were not to be heeded in all cases by their followers. Several strikes were precipitated against the advice of men in authority in these organizations, and the cloud which at the first was no bigger than a man's hand has grown until at present capital, always timid, is so much alarmed that many enterprises that were likely to go forward have been temporarily abandoned. In the unsettled condition of affairs many kinds of business are suffering in addition to the building trades. There is lacking a basis of confidence, and, while it is probable that there will be a large amount of building done this year, there will be far less than would have been the case could these misunderstandings have been avoided and all the differences between employer and employee been settled by arbitration instead of by the costly method of strikes.

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A FEW weeks since Mr. Henry Appleton delivered an address in Faneuil Hall, Boston, to the carpenters of that city and vicinity. The address treated of the eight-hour law. The Boston *Herald*, in commenting on it, thinks it would have been a more logical statement of the case if the effort had been made before some other body of workmen. Our contemporary says: "Mr. Appleton is reported to have said, referring to the supposed evils which accrue to the working classes by the increased facilities for production produced by the invention of machinery, that the outcome is that labor must control production or production will crush out labor. Now, there are certain trades in which the application of labor-saving devices has been carried to an enormous extent, if one will compare the condition that the trade occupies with that which it filled a century or even half a century ago. In some of these lines of industry the work of one man, aided by machinery, is equal to what the work of 15, 20 or even 25 men would have been under the systems of the past. But, unfortunately for the force of Mr. Appleton's remarks, the occupation of a carpenter can hardly be classed in this category. It is true that machinery has in various ways limited the character of the work he is called upon to perform, for the carpenter in former days used to make the doors, sashes, blinds, moldings, railings, stair fixtures, &c, which are now made by steam-power in the mills, and are brought to him in a comparatively finished state. But, so far as his own work is concerned, there are very few time-saving devices that have been invented to aid him in his service. He still has to handle his hammer, saw, plane and chisel as his predecessor did three or four centuries ago, and it is questionable whether he can do very much more work in a day than his forefather did. In other words, and for the purpose of illustration, although it is possible that 20 boot and shoe makers working in a well-equipped shoe factory can produce more boots and shoes than 200 boot and shoe makers could have produced with all of the appliances that were at hand 100 years ago, and can therefore claim that invention has accorded to them the right of working a less number of hours per day, it is exceedingly questionable whether 20 carpenters can do much more in the way of house-building than 20 carpenters could have done if similarly employed in the year 1786. Now, at that time the carpenter worked from 12 to 15 hours per day; but if the modern carpenter's hours of day labor are to be cut down to eight, it must be conceded that it is not because, like the boot and shoe maker, he has earned this in consequence of greater productive power, but because we propose to make things easier for him and give him less work to do. But this distinction, which, it seems to us, is a sufficiently obvious one, does not seem to have so much as suggested itself to the orator of the evening at Faneuil Hall."

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WE cannot agree in all respects with our exchange. The average carpenter has profited by labor-saving devices more than is apparent upon the face of it. If any one has seen a chest of tools of the kind that were in use 100 years ago, and will take the trouble to compare them with the neat and convenient devices with which the carpenter at present executes his work, a difference of great importance will be observed. The saws and chisels and planes of the present day are of a character to permit more work to be done in a day than would be possible with the tools of a former generation. Besides, the house carpenter's field has been encroached upon to probably a greater extent than that of any other class of mechanics. Not only is the modern house carpenter, with his improved hand tools, able to do more work than his fellow of a century since, but, proportionately, there is less to be done. Formerly, as our exchange says, carpenters included in their work the making of doors, sashes, blinds, &c., which are now made in large factories. A little further back and the carpenter supplied the lumber, and one time, if we mistake not, he supplied the wooden pins or fasteners which nails subsequently supplanted. Machine-work is more and more entering into the house-building trade, and, so far as the argument above is presented, it would seem that in strict justice the carpenter has as much claim to a reduction of the hours of labor as any other mechanic. The tendency of the times is toward shorter hours of labor, and perhaps more intense occupation during those hours. In this progress carpenters are entitled to share as well as members of the other trades. In working for a reduction of hours, however, one thing should be borne in mind. The carpenter's employment in many cases is only for certain months in the year, for wherever winter prevails there is a period of enforced idleness. Carpenters should not, therefore, attempt to make hours so short as to diminish their usefulness or materially reduce their compensation. This no doubt the leaders of the movement have carefully considered.

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THE exhibition of the Industrial Education Association, held recently at Cosmopolitan Hall, this city, was well worthy the inspection of all who are interested in the various branches of industrial education. The exhibits were of the most diverse nature. There were *repoussé* work in brass from the Philadelphia schools, carved work and molding from other cities, machinery and mechanics' work from Colonel Auchmuty's school. Elsewhere could be seen lacework and embroidery, together with various other examples of fine needle-work. The schools of Boston, Philadelphia and other cities and the Society of Decorative Art of New York furnished examples of inventive drawing and artistic work. School-made bread and cakes were also on exhibition, as well as specimens of the elementary work done in kindergartens. Altogether the exhibition was a most interesting one, and not only the variety of the articles shown, but the excellence of the workmanship displayed, illustrated the wonderful advance that has taken place in this new department of education, and the careful manner in which the work is being carried out. A principal aim of the Industrial Education Association is the introduction into the public schools of this practical system of education. This innovation has already been successfully effected in a number of schools throughout the country. The City of New York, however, either from indifference, excessive conservatism or ignorance of the practical good which can be accomplished in this simple manner, has done nothing toward introducing a department of industrial instruction into its public schools. Reform in old methods is often only accomplished after private philanthropy and enterprise have proved that the new systems are practical and beneficial, and such has been the case with industrial education. Private schools for manual training, though of comparatively recent establishment, have already done much practical good in fitting boys for various trades, but, more than this, they have educated the public to take an interest in their work, and let it be hoped that this interest will not cease till it has accomplished a reform in the public school system and introduced manual training as a regular part of instruction.

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THE competition which at present exists between the great factory, with its organized system of machinery, and the small workshop, managed and controlled by workmen of moderate attainments and of moderate ambition, seems to turn upon the distribution of mechanical motive-power. The opinion—in certain directions, at least—seems to be gaining ground that if the problem of economical distribution of power

be satisfactorily solved the great factory will disappear so far as relates to its repelling features. One of our French exchanges presents an account of one plan of distributing power which is actually at work in France. The experiment has been tried in a locality in which a number of small industries which peculiarly characterize that city are carried on. The principle employed is that of rarefied air. By means of a large steam engine a vacuum of 75 per cent. is produced in a pipe, from which smaller tubes branch off to each workshop. The workshops are severally provided with small motors, worked, of course, by means of the difference of pressure between the density of air in the tube and that of the atmosphere. Thus the power can be distributed in quantities no greater than may be needed to work a sewing machine, for instance. Each workman is supplied with an automatic registering apparatus, and as he is able to shut off the power when it is not required he is charged only for the quantity actually used. A fixed monthly rent is charged in addition to the installation, the rent being proportionate to the size of the workman's room. The principle of rarefied air has been adopted in preference to that of compressed air because there is less danger of accident, and the inconveniences which might arise from the chilling consequences of the use of compressed air in small workshops are avoided. The importance of the economic distribution of motive-power in fractional quantities in Paris is indicated by the fact that in one municipal division alone there are 5000 persons engaged in small industries who require in the aggregate from 1000 to 1200 horse-power per day.

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THERE are some serious defects in, as well as serious objections to, some of the common plans of construction employed in modern houses. In some instances these features are elements of danger in house sanitation. For example, the space underneath the floors in dwellings, between the flooring and the ceiling of the room below, is a menace in various ways. In most houses there is no attempt made to fill this space. The floor is laid upon top of the joists, and lath and plaster are put on the bottom, leaving a long open space between the joists connecting with the spaces between the studding at the sides of the building. This free connection permits a circulation of the cellar air all through the system of partitions, and admits of its general dissemination into the atmosphere of the house. It also provides an uninterrupted passageway for rats, mice and other vermin. In case a fire starts in the lower portion of the house, from an overheated flue or other cause, these passageways offer facilities for the spread of the flames, so that in many cases before the existence of the fire is made known it is far beyond control. These are among the most patent objections to the open-spaced floors as constructed in many houses. There are others which are more powerful than those recited, which will become perfectly apparent when attention is called to them. In houses constructed with open spaces there is an inviting place for dust, dirt and other impurities to collect by constant sweeping, scrubbing and the friction of many feet. The modern sanitarian is educated to believe that wherever there is dirt there is danger. The constant presence of germs in decomposing animal and vegetable matter makes the presence of this collection of dirt quite to be feared. Another source of danger is the filling or "deadening," as it is sometimes called, which is used to fill up these spaces when anything is used. Manifestly, it should be nothing of a decomposable nature or a medium which could afford a harbor for vermin. This feature of construction in dwelling-houses is worthy of more attention than it receives. The spread of disease which it facilitates, the risk from fire, the loss of heat generated for warming purposes, and many other reasons that might be mentioned, suggest an improvement in the plans usually employed. The use of asbestos, mineral wool or other matter not liable to become dangerous from its own decomposition or its contact with decomposable material is strongly to be commended for reasons above given.

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WHILE on this subject it may be of interest to describe the mode of building houses that is in vogue in France. One of our exchanges, in describing this subject, says: "In that country, after the perpendicular dividing posts are in place, which are of oak, they are stiffened with oak battens, strong and substantial, nailed on both sides, so that the spaces between the joists may be filled with chipped stone. The plasterers standing on each side press the plaster into the openings between the stone and against the battens, until it becomes one solid mass, vermin and fire proof. In this country such partitions are made of pine studs; laths are nailed upon these above the baseboard, and thin coats of plaster are put on in such a way as to create flues to carry fire from floor to floor, a thing impossible under the French plan. The beams of Paris houses are surrounded with plaster above, between and below, and even when wood flooring is used it does not touch the beam under it. The ceilings are ordinarily made before the floors are constructed, and are formed of plaster pressed from above through strong battens of oak. The same is applied to the frame of staircases, which, instead of being the most convenient made, as are ours, for carrying fire, makes it almost impossible."

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THE collapse of the roller-skating craze is credited with having left large quantities of boxwood on the hands of lumber dealers without a market. This trade is further affected at the present time by a lessened demand for boxwood for engraving. The different processes of engraving which are in the market have materially reduced the consumption of boxwood for this work. Referring to the roller-skating craze, its decline has also left vacant a large number of commodious buildings situated in various communities throughout the country for which there is no immediate use. Some of these would make excellent shops and factories and will no doubt be thus utilized.

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SPEAKING about the celebrated redwood of California, a writer says: "The value for manufacturing and finishing purposes of the richly-grained redwood of California is beginning to be appreciated, though not, it would seem, until after immense quantities of it have been diverted to unnecessary uses. Until recently the rich, curly bird's-eye and other peculiarly-marked species were cut for rough lumber, and the softer, straight-grained kinds being so much more easy to work, less liable to shrink endwise, and not so liable to split in nailing, were the favorite material for building and other purposes for which redwood was used, to the exclusion of the wavy and peculiarly-grained varieties included in the first-class redwood list. Thus trees or logs indicating the very features now so prized in redwood have been used in prodigious quantities, simply because of their size and strength, but it is now a matter of special interest to builders and artisans that, for richness and peculiarity of grain, the redwood is excelled only by the finest of costly hardwood. The shrinkage endwise is special to this wood, but does not extend beyond thorough seasoning."

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IN this day of strikes and trade organizations, it is the unexpected that is always happening. We are prepared to hear of mechanics in the different trades combining and insisting upon certain measures, and it would not be at all strange for builders to unite and charge the architects, for example, with managing their offices in such a way as to work hardship for contracting builders. This could take place, we think, without exciting any surprise in the mind of the average reader, but the very opposite has occurred. Certain architects have issued a circular protesting against unprofessional conduct upon the part of contracting builders, and a boycott on a limited scale has been instituted against them. A general meeting of the architects of the city of Cincinnati was held early in the month of April. The deliberations resulted in the following circular, in which our readers will feel an interest:

CINCINNATI, OHIO, April 16, 1886.

The following resolution was passed by the undersigned Cincinnati architects at a meeting held at the Builders' Exchange, Monday, April 5, 1886:

*Resolved*, That hereafter all builders making a practice of making or furnishing drawings to parties contemplating building will be debarred from the privileges of making estimates in our offices.

Geo. W. Rapp, Smith & Forbush, Rumbaugh & Schureman, Gustave W. Drach, Theodore A. Richter, Jr., Plympton & Trowbridge, Emil G. Rueckert, Edwin Buddemeyer, Des Jardines & Hayward, Jas. W. McLaughlin, Edwin Anderson, Wm. Martin Aiken, Samuel Hannaford, W. W. Franklin, H. E. Siter, Chas. Crapsey.

Builders who have been furnishing drawings, and who desire to retain their privileges in the above offices, will please notify the secretary at once, in writing, of their discontinuance of the practice, and have their names removed from the black-list. OLIVER C. SMITH, Secretary.

The conduct of the builders complained of in this circular is not peculiar to those doing business in Cincinnati. Objections could as well be raised against a large number of builders in other sections of the country. The practice complained of prevails in all of the large cities. The result of this effort upon the part of professional designers and superintendents to discriminate against builders who attempt to conduct business without their assistance will be watched with the greatest interest.

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## THE PLATES.

On Plate XVII we show a sideboard design which will interest the cabinet-makers among our readers. It is in a style that is being extensively employed by English furniture manufacturers at the present time. Plates XVIII and XIX contain the elevations and floor plans of a house design submitted in the Seventeeth Competition over the *nom de plume* of "Cui Bono." The study has been carefully considered, and contains many desirable features. The details accompanying this design will be found on pages 66 to 68 inclusive. On Plate XX is presented a study in summer-house design that will be acceptable to many of our readers, especially at this season of the year, when such work begins to be in demand. Many of the features in the design are capable of application independent of the peculiar construction here illustrated. Above this design we present some patterns of sawn scrollwork which form desirable additions to those already published in these pages.

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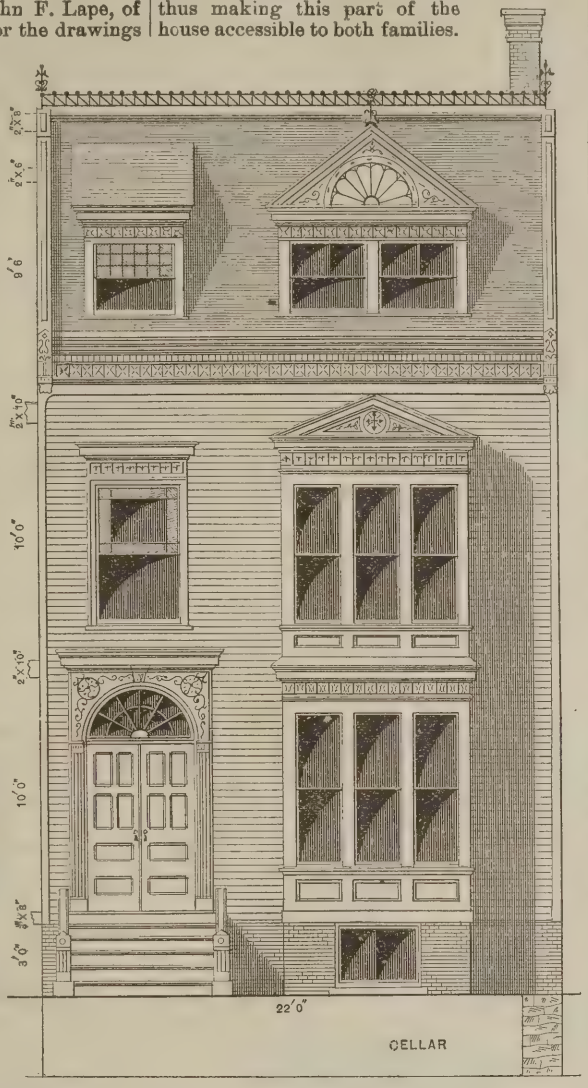
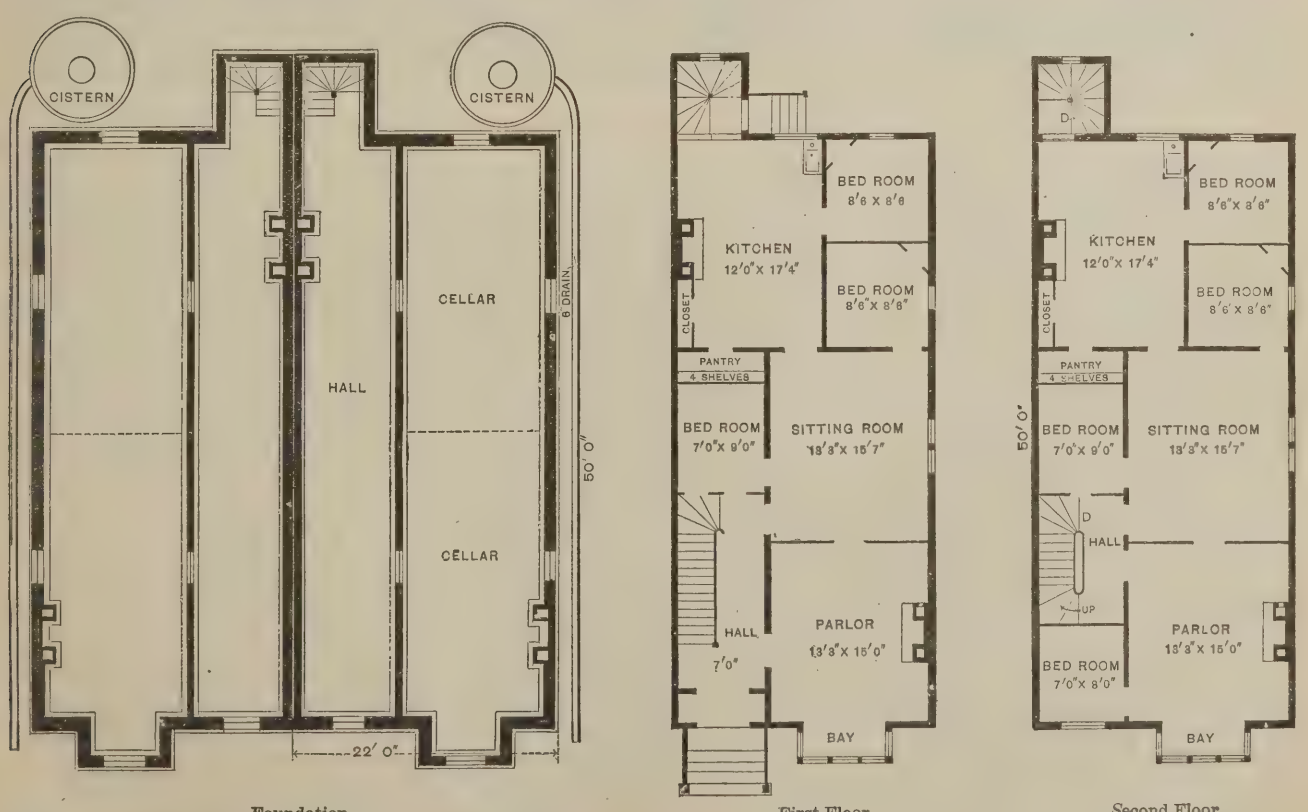
According to recent English experiments, it is found that a growth of ivy over a house renders the interior entirely free from moisture.

## Village Tenement.

We are indebted to Mr. John F. Lape, of Greenbush, Albany, N. Y., for the drawings from which the accompanying elevation and floor plans of a village tenement have been prepared. The elevation and first and second floor plans show one-half of a double house, the full extent of which will be gained from inspection of the foundation or cellar plan. The design of the author has been to devise an arrangement of rooms in a house of moderate cost which would accommodate two small families comfortably, and that, too, without the annoyance which occurs generally where more than one family occupy a building. In some respects the arrangement of the rooms suggests the "flat," so extensively built at present in the larger cities. Plumbing is conspicuous by its absence. Back stairs are provided, by which access to the yard is secured, and the building is supposed to be so located that a side passageway to the rear can be obtained. Windows, it will be seen, are located in the side referred to. Some dark rooms are unavoidable under the conditions existing, but whether they should be used as storerooms or bedrooms is optional with the persons occupying the house. An open fire is provided in the front room of each floor, called the parlor, while the room immediately back of it, or the sitting-room, is warmed by a stove, the pipe of which is carried through the partition to the front flue, as is indicated in the engraving. The cellar, 6½ feet in depth, is provided with a partition which divides it into two portions. The cellar is lighted and ventilated by side windows The back stairs extend to the cellar floor, thus making this part of the house accessible to both families.




*Elevation of Village Tenement.—Scale, ⅛ Inch to Foot.*




Foundation. First Floor. Second Floor.

*Floor Plans of Village Tenement.—Scale, $\frac{1}{16}$ Inch to the Foot.—Jno. F. Lape, Greenbush, Albany, N. Y.*

We understand from the architect that the scheme is to partially finish the upper floor or attic for storage, or to complete it by making four sleeping-rooms to be used on special occasions. Economy of cost has been considered in every detail, the attempt being to supply the largest amount of room and convenience for the smallest sum of money. Mr. Lape estimates the cost of the single house here presented at $3000.

## A Bad Place for Shafting.

In the reports of many mills, says the Western Manufacturers' Mutual Insurance Co., a point of great danger is indicated in the location of shafting beneath the floor in confined spaces that do not permit proper examination and oiling, and that favor accumulation of dust and rubbish. We have deemed it advisable in such cases, where alteration was difficult, to require automatic sprinklers, set 5 feet apart, above such shafts, and in all cases, where practicable, to ask an enlargement of the space sufficient to admit of easy examination, oiling and cleaning. It is desirable to call attention to this practice as both unsafe and unnecessary, as the defect continues to appear in new mills, in many cases designed by builders who should know the danger attending it. All shafting should be examined and cleaned daily, and lubricants supplied at proper intervals and in proper quantity, to insure safety and economy of power; any obstacle to this constitutes a serious hazard. Where shafting must be placed beneath the floor of a mill in a low basement or small confined space, it is best run in a brick-arched or cemented passage over a trench deep enough to give 5 or 6 feet vertically, and at least 4 feet wide, which is about as small a space as oilers and cleaners can safely work in; it is very rarely, if ever, that shafting is so located from necessity, it being rather an individual freak of the owner or builder, either ignorant or careless of possible consequences. Belting from above, where practicable, is safer and avoids needless openings through floors.

It is claimed that scaffold ropes may be preserved from atmospheric influences by dipping them when dry into a bath containing 20 gram of sulphate of copper, per liter of water, and keeping them in soak for about four days. When dried the ropes will have absorbed a certain quantity of sulphate of copper, which will preserve them from the attacks of parasites and from rot.

## Wrought-Metal Grill.

Many of the modern writers on art metal-work are wont to turn to the articles wrought by mediæval smiths for their inspiration. Those who have pursued this subject have been entertained with accounts of the wonderful handicraft of the ancient smith, and samples of railings and hinges, finials and crestings, grills, screens and many other pieces have been freely illustrated, while little or nothing is said about the modern smith. There is danger, accordingly, of the modern artisan or metal-worker losing the credit that is justly his due. For ourselves we have very little sympathy with the feeling that art in certain departments of handicraft expired many years since, and that it is impossible for the modern artist to equal the work of his older brother, and this seems to be the opinion of many artists and manufacturers of the present day, for they persist in producing specimens of art metal-work which, had they but the glamor of romance about them and the time stains which so generally add interest to articles of this kind, would put to shame many of the great examples of bygone excellence. Every one who has entered a handsomely fitted office with modern appointments, including brass railings, decorated screens, &c., with which banks and insurance offices are supplied to make the places attractive, must have been impressed with the real skill displayed in the work and the artistic excellence of many of the pieces employed. A great many examples might be cited serving to illustrate the point we desire to make, which is that the modern smith, whether considered as a mechanic or as an artist, is not one whit behind his fellow of "ye olden time."

For several years past the firm of J. B. Shannon & Sons, of Philadelphia, have been giving special attention to wrought-metal work for various purposes. Many articles of this kind executed to order have possessed unusual merit and have deservedly taken high rank as artistic productions. We have had the pleasure in the past of examining some tablets for monuments, grills to be used in different positions, altar-work for cathedrals, brass screens, railings for office-work and various kinds of metal decorations for interiors, which have been of more than passing interest. Recently this firm have executed a piece of metal-work intended to specially illustrate their skill and to show in a practical way what is possible of accomplishment in this direction. A design was selected having allegorical features as well as a practical application. A photograph of the work formed the basis of the engraving, which we present herewith. The center piece of this grill, which represents the typical smith at work, is made of sheet copper and was beaten up. The foils finishing the circle surrounding the figure have also a rim of beaten copper. The name of the firm at the left and the panel at the right containing the location and a mention of the business are likewise of copper. The general framework of the grill is of iron, as also are the leaves and stems and rosettes which form the setting of the central panel. The purpose of this grill, in addition to what we have already mentioned, is to finish one of the desks in the office of the firm, at 1020 Market street, Philadelphia. Our engraving does not exaggerate the artistic excellence of the work, but, if anything, does it scant justice. The workmanship is very fine and justly entitles the mechanic who executed this work to a high position as an artist.

*Grill Executed in Wrought Iron and Sheet Copper by Messrs. J. B. Shannon & Sons, Philadelphia.*

## Boat-Building for Amateurs.

BY H. L. CAMPBELL.

(Concluded from page 65, April issue.)

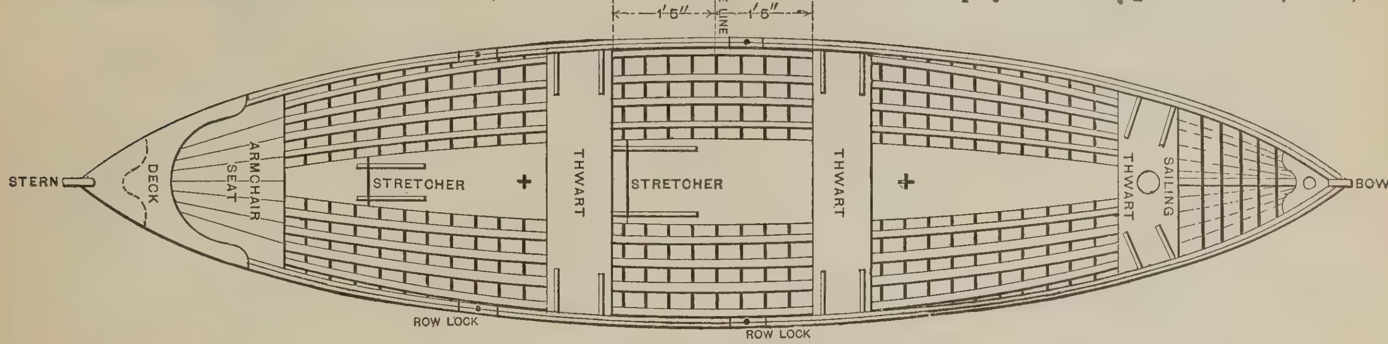
We are now ready to take what is called a "spiling" for the next strake. This operation consists of taking a straight piece or batten of material, 4 or 5 inches wide, the same thickness as the planking, and about 20 feet long, and placing it in position with its edge against the edge of the garboard at the midship mold. It must be firmly shored at this point, and clamped or shored at the quarter-molds till it lies flat against each one. It must then be clamped at each stem. Care must be taken not to twist the batten in making it conform to the shape of the molds, but raise up and down on the stem till it lies naturally against the quarter-molds. In its final position it should be the same hight on each stem. We now set our compasses at the widest space between the lower edge of the batten and the gauge line on the garboard. This will be at the stems. Commencing at the stem, place one leg of the compasses on the gauge line of the garboard, and make a prick-mark with the other leg in the batten. Repeat this every 2 or 3 inches from the stems to the midship section, always remembering to keep the compasses in a line at right angles to the keel, supposing the keel to have no camber. We now take the batten off and lay it on the next plank, keeping the lower edge of the batten the distance that the compasses are set at away from the edge of the plank. Now, setting one leg of the compasses in the prick-marks on the batten, we make another series of prick-marks in the plank with the other leg, keeping the legs of the compass at right angles to the edge of the plank. We have now transferred the shape of the garboard gauge line to the plank, and, after tracing a line through the compass marks, we may rip the surplus material off, leaving ½ inch or so outside the line for subsequent corrections. After taking the width of this plank from the molds and stems, they may be laid down at the proper places, and, after allowing for the lap, trace a line through the points, and allowing ½ inch more, as on the lower edge, the surplus material may be ripped off. Now measure up ¾ inch from the compass marks on the lower edge, and transfer this measurement to the inside of the plank. Repeat this at several places along the plank. These marks are where the top edge of the garboard should be when the second strake is in position. We are now ready to make a trial fit.

For the purpose of holding the strakes in position while fitting and fastening them, we need four or five clamps, see Fig. 15,* made like a large clothes-pin, and used as shown in the figure. Placing the strake in position, and bringing the marks on the inside even with the top of the garboard, the strake should lie close to each of the molds when clamped in position on the stems; if it does not, it may be moved up or down not to exceed the margin left at top and bottom, and, when correct, a pencil line may be run the whole length on the inside along the top of the garboard. Taking the plank off, we run another line ¾ inch below this one for the lower edge. After working our material down to this line with draw-knife and smooth-plane, we make the necessary corrections in the top line of the strake, smooth and sand paper it, and, laying face downward on another plank, mark out the strake for the opposite side. We now run the gauge line along the outside upper edge, and plane off the hood bevels on the outside upper edge, and a corresponding bevel on the inside lower edge to fit over the bevel already made on the garboard; when in position these bevels should be like Fig. 16, a short distance from the stem. The outside lower edge must now be rounded its entire length, as shown in Fig. 13, and the strake is now ready to nail in position; one end may be fitted and fastened, and nails driven every foot or so, then fit the other end and finish nailing. The places where the ribs come must be marked on the inside of the strakes at right angles to the keel, and the place where the rib nails come skipped. Where one or both strakes are straight-grained the nails must be staggered or put a little way on each side of a straight line, otherwise a crack may start, and, jumping from nail to nail, extend quite a distance. If the grain is not straight, the nails may be placed in line. It would be advisable to finish nailing each strake as it is put on; it is easier to do then, and, as there are from 2000 to 3000 nails to be driven, it is a tedious job if many are left till the strakes are all on.

The same operation is gone through with each successive strake in the same order. If the amateur expects to build a similar boat at any future time he may make a pattern of each strake as he works them out, and lay them away for future use. It is advisable to make each strake in a single piece, till the waste of material becomes too great. When the strakes become so crooked that a whole piece cannot be got out of a plank 12 inches wide, they must be made in two pieces; the first splice should be made near one end, the next one near the other end, while the next may be made in the center; this will keep the splices a good ways apart, which makes their appearance less objectionable. The splices must be made by a scarfed

*For figures previous to Fig. 19 see April number.

joint, not less than 8 inches long, and it need not be more than 12. (See Fig. 17.) There should be four rows of copper nails in the scarf, the nails being spaced from ½ to ¾ inch apart vertically. The strakes should not be planed to less than $\frac{1}{16}$ inch thick at the ends, and the splice must always point aft on the outside. As it requires a great deal of trouble and care to make the planks assume the circular form of the mold on the stem. Any little hollows or kinks can then be straightened out by looking along from end to end, and the wale finally fastened by driving nails every 3 inches through the top strake and clinching them on the outside. They should not clinch put in half the number to start with—one can be drawn out and tested from time to time, till they are found flexible enough to bend; they should be first nailed into the center of the keelson with nails about 1 inch long; it was for this purpose that the screws in the keelson were put on the sides. The other nails should then be driven as rapidly as possible. The ribs should be long enough to project above the gunwale about 4 inches,




*Boat-Building for Amateurs.—Fig. 19.—Deck Plan.—Scale, ⅜ Inch to the Foot.*

turn of the bilge, it is necessary to trim the bilge to a polygonal shape, as shown in Fig. 13, the shape of the mold before trimming being shown by the inside dotted line. The amount to be taken off the quarter-molds will be very little. It will be noticed in Fig.

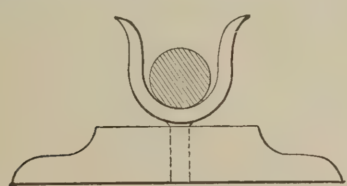


*Fig. 20.—Open Rowlock.*

13 that in the two laps on the turn of the bilge the wood of the under strake is very much cut away at the midship section, and does not leave very much for the nails to clinch in. Although the joint can be satisfactorily made by using light nails at this point, it is better to introduce two oak ribbons, about an inch wide and $\frac{3}{16}$ inch thick, to clinch the nails in. This clamps the thin edge of the strake firmly and makes the joint very strong. It also keeps the ribs from being bent into a kink at these points. These ribbons need only run from one quarter-mold to the other, as the joint assumes its normal shape as it approaches either end.

It may be remarked here that the greater the number of strakes in the side of a boat the easier it is to turn the bilge. The strakes on the bottom may be made a great deal wider, and those around the bilge narrower, if it is desired to reduce the number and economize time, but the boat will not have as fine an appearance as one built with the strakes all alike and evenly spaced. If the boat is to be finished in oil and varnish its appearance may be greatly improved by making the top strake of black walnut, cherry, mahogany or any other hard and dark-colored wood. The upper edge of the

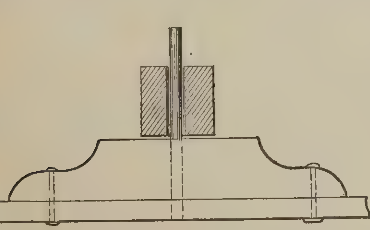


*Fig. 21.—Rowlock Used on the Lakes.*

top strake may be left a little full and the hights of the stations on the sheer plan set off on it by measuring up from the floor. The rimwale can now be put on. This should be of oak, about ½ x ⅞ inch, with the under corner slightly rounded. It can be tacked lightly from the inside at the hights, set off and fastened with a screw to more than ⅛ inch and should be driven against a steel face. The places where the ribs come must also be skipped. The top strake can now be planed down to an even surface with the wale, and the operation repeated on the other side.

As the two sides must be made exactly alike, the other wale must be adjusted by leveling across from the first one put on, or by measuring up from the floor, always supposing that the floor is level, which the builder must be sure of, or some grave mistake may be made. As the strakes are put on, the ribs should be marked on each one with a flexible batten, kept at right angles to the line of the keel, in order to show where the rib nails will come. When the rimwales are on, take the smallest bradawl obtainable and bore through the center of each lap on the line of the rib; this will show where to put the nails on the outside. A piece of wood must be held on the outside to prevent the awl from breaking out splinters; the holes must then be enlarged through the first plank from the outside with a large awl, and the nails inserted in all the holes and tapped gently to secure them from falling out. The nails should be the same kind as those used in the laps, long enough to clinch $\frac{3}{16}$ inch or ¼ inch. The ribs should be oak or elm, ⅜ x ½ inch, the largest dimension next the planking; the inside corners may be slightly rounded off. The ribs must be steamed to make them flexible enough to bend in without breaking. A serviceable steam-box for this purpose may be made as follows: Take an ordinary iron pot and fit a wooden cover to it as tight as possible; get a 1½-inch gas-pipe nipple, and, cutting a hole in the center of the lid, screw the nipple into it; make a wooden tube about 6 inches square and long enough to take in the ribs; close up one end, leaving the other end open; bore a hole through the center of one side to fit the nipple, and screw the box down on the lid; fill the pot nearly full of water; set on the stove, and when it begins to boil put on the lid and box, put in the ribs, and close up the open end with rags, shavings or a lid. It will require two, one on each side of the boat, to nail in the ribs, as they "set" very quickly after being taken from the hot-box. Allowance must be made for breakage, and more ribs steamed than are actually required.

This part of the work must be done very quickly, as the ribs become brittle if cooked too long. It is perhaps the better way to as they have to be bored for the rivets; if they are cut off before being bored they will split. Before putting in the ribs the molds may be taken out, as they are of no further use; the shores between the molds, and the braces on the stems, must be left in place. The ribs should be put in all in one piece, as long as they will stand the sharp bending required toward the ends. When they begin to break they may be put in in two pieces. After the ribs are all in, the gunwales are next in order; these should be of oak, as that is the strongest, but if we wish to be very fancy we can make the gunwales and rimwales of black walnut; the gunwales should be about ⅞ x 1¼ inches, and may be rounded or chamfered on the lower edge; they must be fitted neatly to the stems, and a screw long enough to pass at least ¾ inch into the stem should be put through the rimwale from the outside. Holes must now be bored

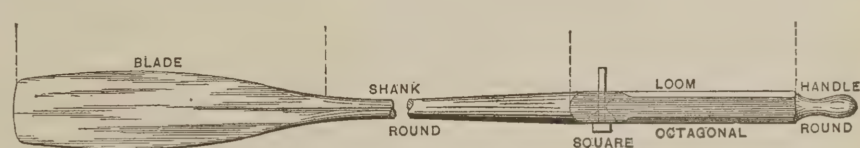



*Fig. 22.—Detail of the Oar.*

for rivets through each rib, boring from the outside through both wales. The rivets generally used are 2½-inch wrought nails, the heads countersunk in the rimwale with a center bit, and the surplus point cut off with a pincers and riveted over a copper burr. The projecting ends of the ribs may now be sawed off, and the tops pared off

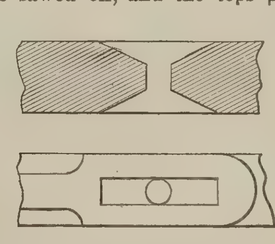
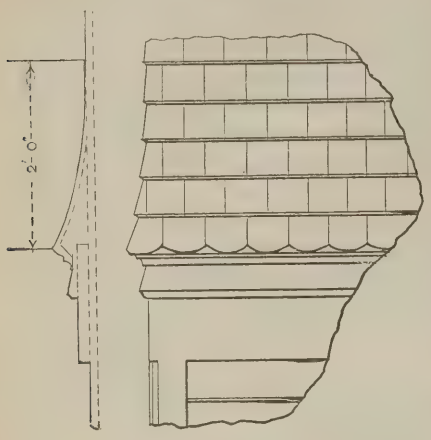


*Fig. 23.—Detail of that Part of the Loom of the Oar Working on the Pin.*

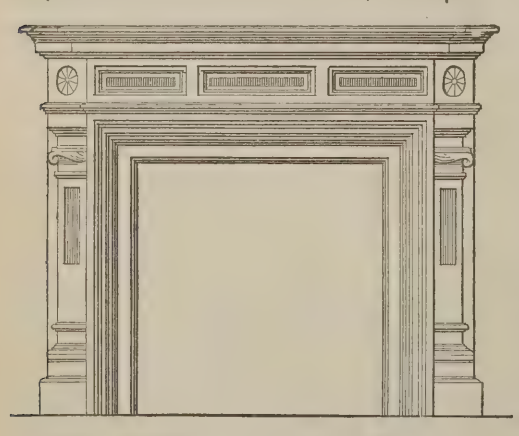
smooth and even with a chisel. After the gunwales are in and riveted, the breast-hooks may be put in. These are natural crooks, put in between the gunwales at each end, and serve to hold the boat jointly together at these points. It should be about 1½ inches thick, set even with the gunwales at the bottom, and planed off evenly with them at the top. It must be planed rounding, leaving it higher in the center than at the sides. A ¾-inch hole for the painter may be bored through it. By referring to Fig. 18 it will be seen that the gunwales

and rimwales are tapered some, and the first rib cut away to allow the gunwales, rimwales




*Details of "Cui Bono's" Design.—Center Cornice.—Scale, ½ Inch to the Foot.*

and planks to come together on the stem; the spaces between gunwales and planks are then filled with wood, and the breast-hook screwed and riveted in securely. The thwarts are next put in, spaced as shown in Fig. 19, and secured as shown in Fig. 13, the knees being riveted through both wales and to the thwarts; the knees used are generally hackmatack, but beech, maple, oak or any hardwood will answer the purpose admirably. A half-day's hunt through a piece of woods ought to furnish the amateur with all the knees he will require. The hackmatack knees are formed by the roots and trunk of the tree, of the former of which there are sometimes as many as five growing out at right angles to the latter. The sailing thwart should have a piece screwed or riveted on the under side, with the grain running contrary to the thwart. The hole for the mast should be about 2½ inches in diameter, that in the step about 1½ inches. The step should be 2 inches thick, and securely screwed or riveted to the keel. The better way is to run a tube from the thwart to the step. It may be parallel, and the mast slightly tapered, to prevent sticking. With a step alone the mast is liable to slip out and split the thwart or damage the side of the boat, but with the tube it cannot. X X tin will



*Design of Mantel.—Scale, ½ Inch to the Foot.*

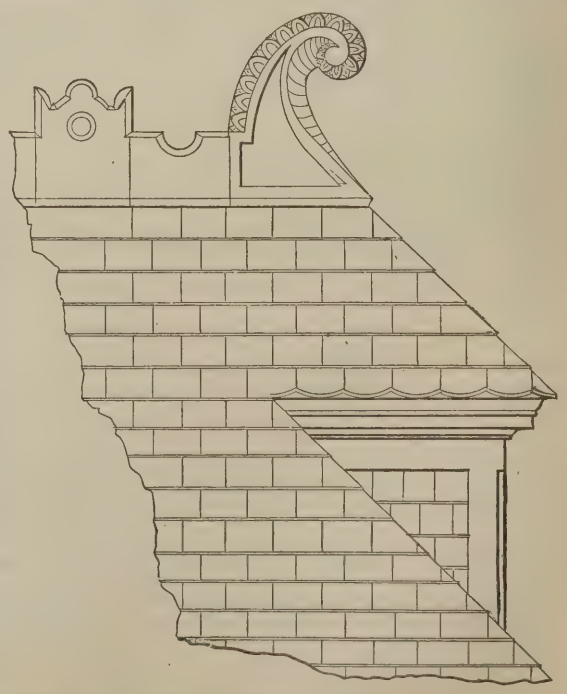
answer for the tube. The stern-seat should be made of tapered pieces of ½-inch stuff, secured to two cleats, the cleats resting on long ledges, the same as the thwarts, and notched into them to keep them in place. The seat should be made as large as shown in Fig. 19, to receive an armchair without legs, making a very comfortable seat for a lady. A small deck is put on over gunwales and breast-hook, being flush on the edges with the former. It may be ⅜ inch thick, and should have a slight crown. If the boat is to be used for rowing only, both ends should be finished in this manner. The seats may be made of alternate narrow strips of walnut and pine, and a bulkhead may be fitted under each seat, joining a small locker. It should be fastened in place with screws, so that it can be removed. After the thwarts are in, the stretcher or bottom board may be fitted and put in. This should be of ⅜-inch or 1½-inch whitewood or basswood, as these woods will stand more hard usage without cracking than pine. The stretcher-board and linings may be fitted before the thwarts are put in, but they must be taken out and replaced when the thwarts are in, for the following reason: Every fall, when the boat is laid up for the winter, the stretcher-board, linings and stern-seat should be taken out, and the inside of the boat thoroughly scrubbed and washed with soap and water, preparatory to painting for the following season. If the linings and stretcher-board are put in after the thwarts are in, the builder may be sure that he can take them out the same way. Cleats should be screwed on the stretcher-board to place the heels against in rowing; the exact place must be determined by experiment, as their distance from the thwart depends on the length of the rower's legs. Adjustable stretchers may be made, as shown in Fig. 19, by screwing parallel pieces to the stretcher-board, pointing fore and aft, with a series of notches cut in the upper side, inclining forward at an angle of 45°; a piece of board with a piece screwed to the back to fit in these notches, including aft at the same angle, makes a very good stretcher. The linings must be curved to fit the shape of the boat, and must diminish





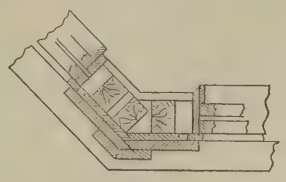


*Detail of Small Gable in Front, with Sectional View.—Scale, ½ Inch to the Foot.*



*Side Elevation Dormer Window.—Scale, ½ Inch to Foot.*

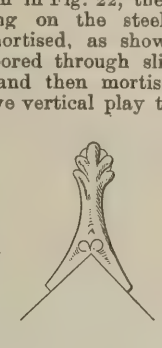
in width toward either end; they may be made of the same material as the planking, and may be wider and fewer in number than



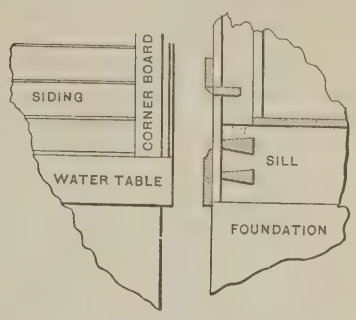
*Details of "Cui Bono's" Design.—Horizontal Section Through Angle of Bay.*

those in Fig. 13. They should be painted both sides before being put in place.

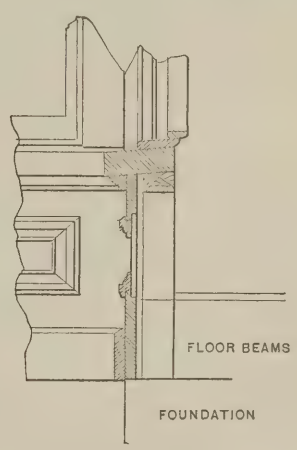
The rowlocks are set 15 inches from the center of the thwart to the center of the rowlock. There are a great many kinds in use. The open rowlock, Fig. 20, requiring a round oar, which may be pulled with a straight stroke or feathered at will, is not so easy for the novice as the one shown in Fig. 21, which is in universal use on the Great Lakes. It consists of an oak block, A, 1½ inches in hight, and wide enough to be flush with the outsides of the wales. It is riveted to both wales at each end, light rivets being used in the rimwale and heavier ones in the gunwale. The top of the block, on which the oar plays, is about 4 inches long, and should be covered with a thick piece of sole leather. A piece of hardwood is fitted and secured between the gunwale and plank, under the block, and extending between the ribs. A hole is now bored through the block, so that it will come between the gunwale and plank, and a piece of ½-inch round steel is driven tightly in; it should be long enough to project 4 inches above the top of the block when the lower end is even with the bottom of the gunwale. The oar used is shown in Fig. 22, the part of the loom working on the steel pin being square and mortised, as shown in Fig. 23. A hole is bored through slightly larger than the pin, and then mortised at top and bottom to give vertical play to the oar. This style of oar and rowlock is quite popular, as the rowlocks cannot be lost, and, the loom of the oar being heavy, the oar is nicely balanced; they may also be allowed to trail in the water without danger of dropping off. It would be supposed that the hole through the oar would weaken it at that point, but we have never seen one of these oars broken at the loom; they generally break at the junction of the shank with the blade, or about the smallest part of the shank. The length of the oars depends almost entirely on the strength of the oarsman. One man can handle a 10 foot oar more easily than another would one of 8 feet. About 9 feet in length is a good average. We would not advise the amateur to make his own oars. Good white-ash oars of the above description, but not bored or mortised, can be bought for 9 cents per running foot. If the boat is to be painted inside and out, it should receive a coat of paint on the inside before the ribs are put in. Three coats of paint inside and out will be sufficient; the paint should be applied thin in order to get the wood to absorb as much oil as possible. The builder must suit his own taste in regard to colors. A boat painted black outside, with a gold stripe ½ inch wide, ½ inch up from the bottom of the top strake, and the interior and the wales finished in their natural color with two coats of boiled linseed oil, one coat of orange shellac and one or two coats of spar varnish, cannot be excelled in appearance. If the outside is finished in oil, proceed as just directed for the inside. In painting or oiling the outside the material must be applied plentifully on the laps and the boat allowed to stand bottom upward till dry. The bottom of the stretcher-board should be covered with sheet brass where the heels of the oarsman come, to prevent unnecessary wear, and a piece of heavy canvas should be fitted over the whole bottom of the boat up as far as the thwarts; this will keep the bottom of the boat clean and prevent sand, gravel and dirt from getting under the linings and stretcher-board. The stems should be finished at top, as shown in Fig. 11, and faced with half-round iron the full width of the face of the stem. The end pieces should be welded to and be continuous with the iron band on the keel, and should run over the top of the stem and screw to the breast-hook. By



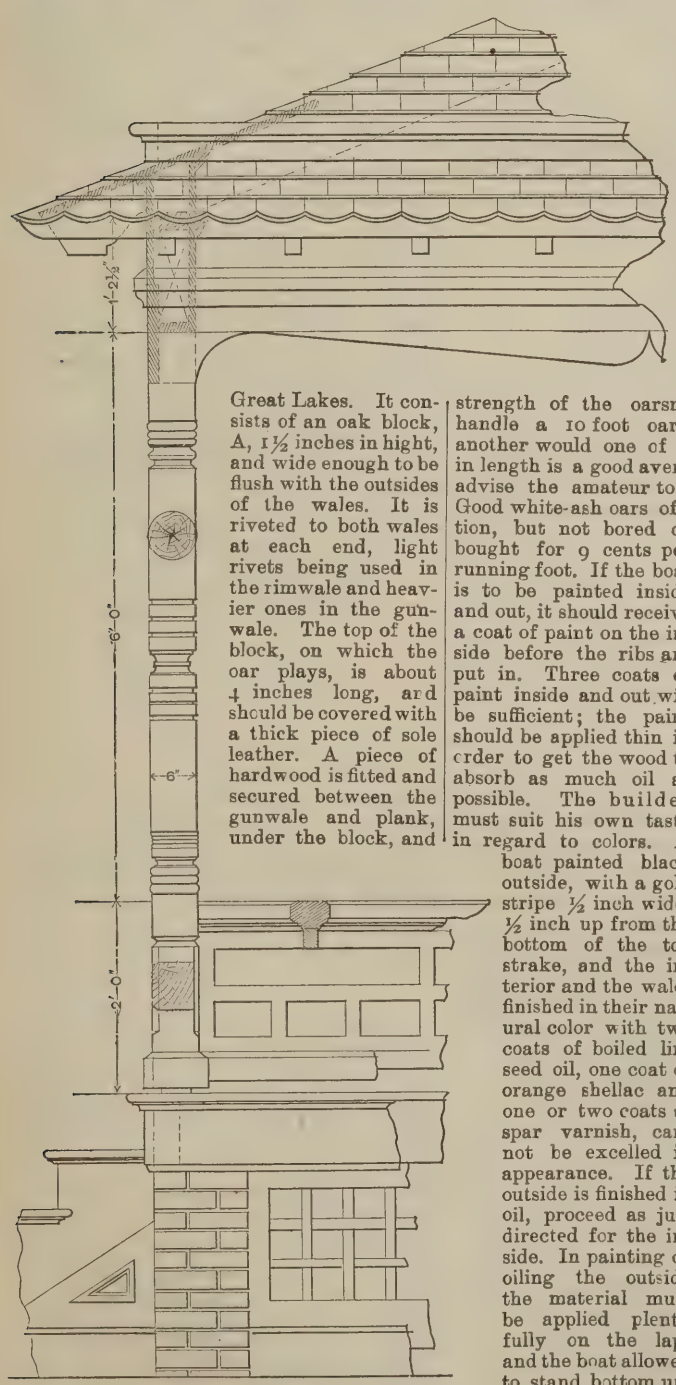
*Roof Ornaments.—Scale, ½ Inch to the Foot.*



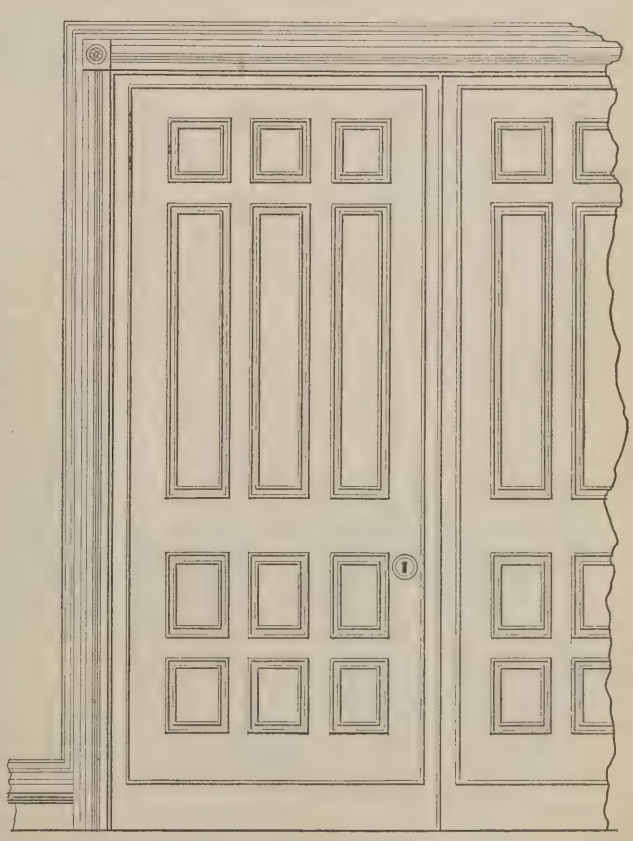

*Detail at Line of Water Table.—Scale, ½ Inch to the Foot.*




*Section Through Base of Bay Window.—Scale, ½ Inch to the Foot.*

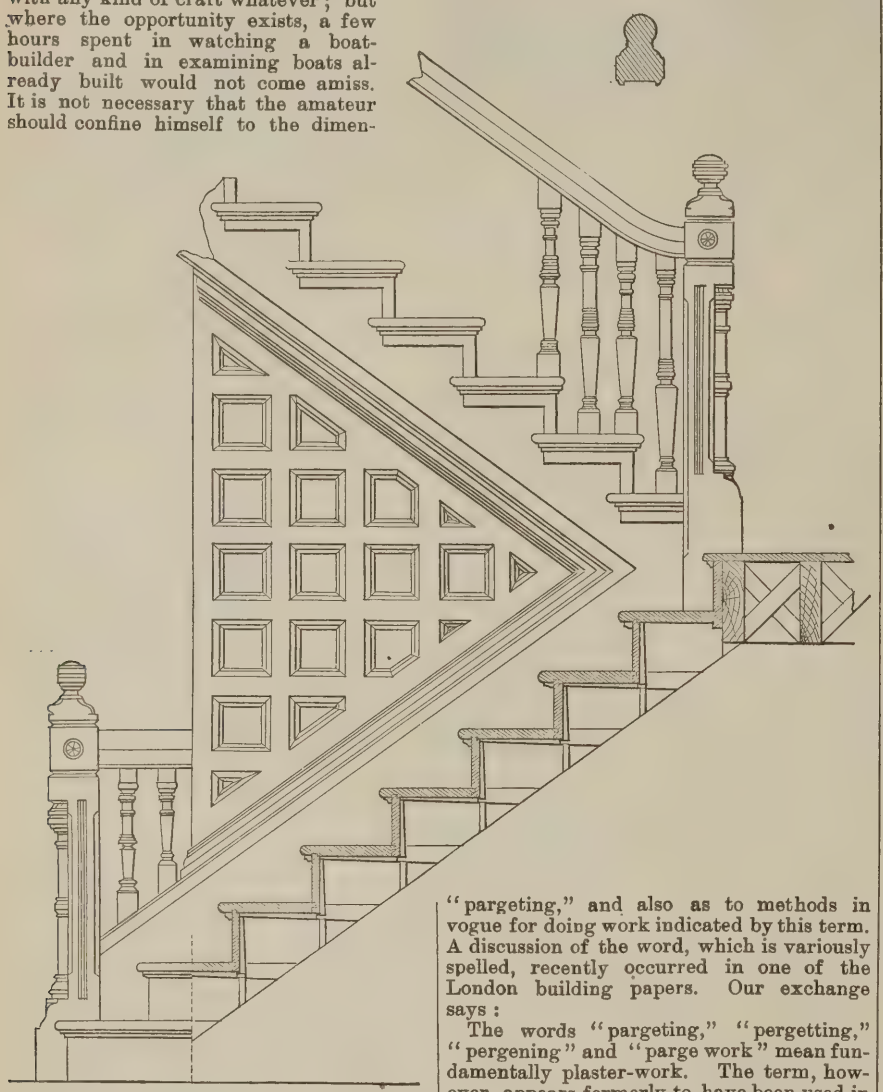



*Detail of Piazza.—Scale, ½ Inch to the Foot.*



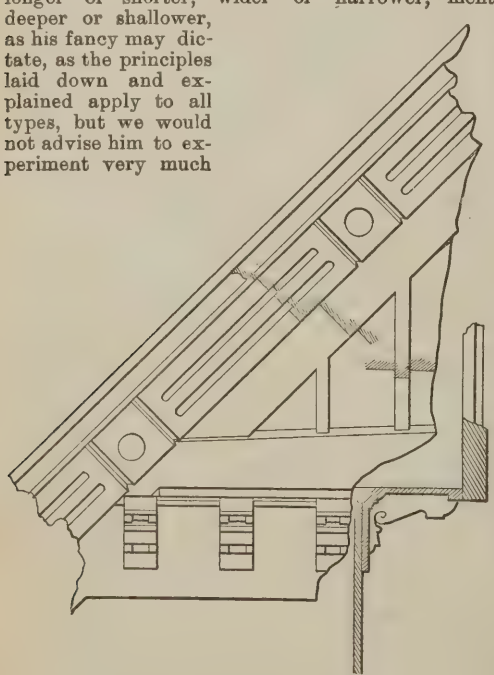
*Sliding Doors.—Scale, ½ Inch to the Foot.*

carefully observing the foregoing directions, and exercising a little patience and ingenuity, the amateur may be tolerably certain of success, although he may not be familiar with any kind of craft whatever; but where the opportunity exists, a few hours spent in watching a boat-builder and in examining boats already built would not come amiss. It is not necessary that the amateur should confine himself to the dimen-



*Detail of Design by "Cui Bono."—Front Stairway.—Scale, ½ Inch to the Foot.*

sions of the boat illustrated; he may build longer or shorter, wider or narrower, deeper or shallower, as his fancy may dictate, as the principles laid down and explained apply to all types, but we would not advise him to experiment very much



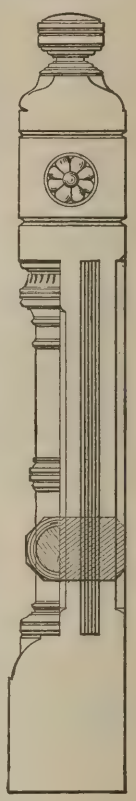
*Detail of Main Front Gable.—Scale, ½ Inch to the Foot.*

in his first attempt for fear he may be disappointed in the results.

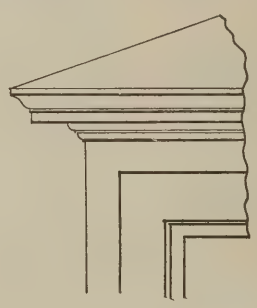
## Pargeting.

In the past we have had several inquiries with reference to the meaning of the word "pargeting," and also as to methods in vogue for doing work indicated by this term. A discussion of the word, which is variously spelled, recently occurred in one of the London building papers. Our exchange says:

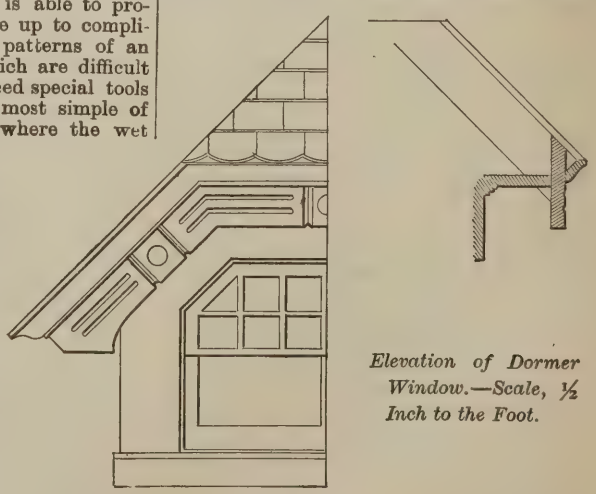
The words "pargeting," "pergetting," "pergening" and "parge work" mean fundamentally plaster-work. The term, however, appears formerly to have been used in several senses, sometimes for plain plastering on walls, but usually for such as was made ornamental. This was effected by moldings, foliage, figures and other enrichments applied in relief, and by various ornaments and patterns sunk in the surface of the work, or formed on it in a smoother material than the rest. Timber houses of the time of Queen Elizabeth are often to be found with the exterior ornamented with pargeting. The styles of pargeting vary almost endlessly. They range from the very simplest patterns which the rudest provincial bricklayer is able to produce without appliance up to complicated and elaborate patterns of an artistic character which are difficult to accomplish and need special tools made for them. The most simple of all patterns is that where the wet plaster is marked out into rectangular or parallelogramatic panels by the aid of the straight-edge, and the interior of the panel is then gone over with the trowel, jobbing the point of that tool in the moist plaster, so as to leave a small depression. What in a piece of carpenter's work would be called the "stiles" and "rails" are left untouched. When even this simple pattern is well done the work is good. All kinds of right-lined figures are easily produced by the aid of the straight-edge and the mason's square. Circles and curves are more difficult, because it is not always easy to find a center from which to stroke them. For this purpose a long and sharp-pointed nail should be driven into the laths where they cross a post or timber, so as to have a firm center. A piece of string can be tied to this, and the other looped around a piece of pointed steel or iron, when any required curve can be drawn by the latter. There can be but little doubt that the ancient pargeters produced their more elaborate patterns by using small stamps cut out of hardwood and working them all over the moist surface. Other patterns appear to have been produced on the soft surface by the application of small tools in a manner analogous to that pursued in wood-carving. Doubtless ornaments in high relief could be produced by the use of "compo" moldings, such as are used by the internal plasterers for ceiling. If such were pressed in the plaster they would adhere when dry, but they would be liable to the objection that when weathered their yellow-brown hue would not harmonize with the glassed surface. No extensive revival of pargeting, however, is to be expected. Doubtless the old lath-and-plaster form of construction is doomed to perish before brickwork. It is perhaps a pity, for this kind of house is cheap, durable and warmer than a brick one. It is also, strange to say, often more weather-tight. No shower, however violent, can ever saturate a plaster wall, because there is an intervening space between the external and internal surfaces. But if a wall made of soft brick is exposed for any considerable time to a heavy oblique shower the porous fictiles become saturated almost as easily as a sponge would be. There are still many good examples of ancient ornamental pargeting



*Newel.—Scale, ½ Inch to the Foot.*



*Cornice of Bay Window.—Scale, ½ Inch to the Foot.*



*Elevation of Dormer Window.—Scale, ½ Inch to the Foot.*

extant, of course always in old houses. In the market place at Newark is a wooden house, with small figures and canopies over them in plaster-work between the timbers, some of earlier dates. Some good examples may be found in the ancient town of Oxford, England. Among these may be instanced part of the front of Bishop King's house, covered with an elaborate and effective pattern, also a beautiful-shaped panel in High street, and a panel with much of a French character in the Corn Market.

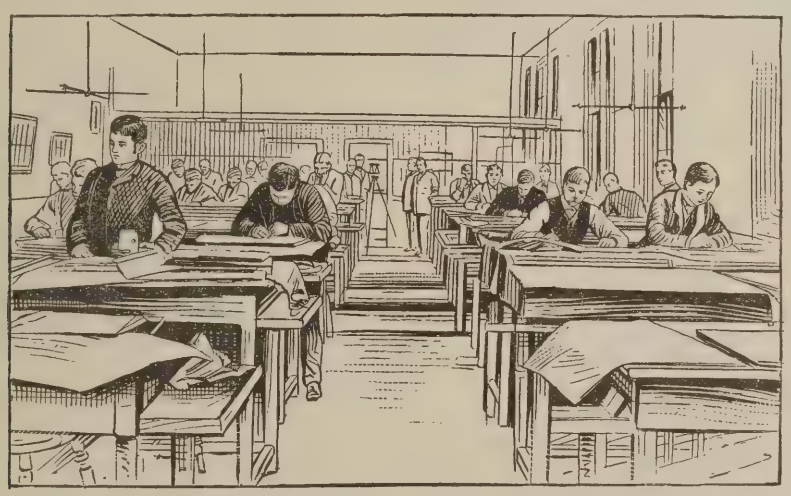
## Instruction in Architecture.

The Boston *Herald* has been recently giving a very thorough and interesting account of the courses of instruction afforded by the Massachusetts Institute of Technology. The methods pursued in this institution are of the greatest interest, not only on account of their inherent value, but because in some measure they replace what has been lost by the abolishment of the apprentice system and other methods of instruction which prevailed in this country up to a very recent period. The three engravings presented on this page are borrowed from our contemporary named. They indicate in a graphic manner the practice in this institution so far as relates to drawing, both in the civil engineers' department and also in the course of architecture. Our contemporary says :

"Among the professional courses of the Institute of Technology, that of civil engineering is one of the most prominent as it is one of the most important. The instruction in this course is given by means of lectures and recitations and by practice in the field and in the drawing-room. The use of the various instruments employed in surveying is taught mainly by actual work in the field. The student is thus made familiar in a practical way with the several operations involved in railroad, hydraulic and sanitary engineering. The work in the drawing-room consists in representing upon paper the surveys made in the field, and in making both working drawings and finished plans from direct measurement of actual engineering structures, a large number of which are found in the immediate neighborhood of the school. The course of civil engineering embraces roads, railroads, bridges, rivers, harbors, canals, water-power, water supply, sewerage, drainage and irrigation. The subject of roads and railroads includes the survey, location, construction and equipment of railroads, and the laying out, building and maintaining of town and country roads, and of city streets and pavements. In addition to the work of the classroom, an actual railroad survey and location several miles in length is made each year upon such ground as shall best illustrate the actual problems occurring in practice. The course of hydraulic engineering embraces the subject of theoretical hydraulics, with its practical applications—hydrology, rivers and canals, water supply, water-power, coast and harbor works, and irrigation. The practical application of the principles of hydraulics is illustrated by numerous examples, and in hydrometry the student is made practically familiar with the best methods by actual practice."

Concerning the course in architecture, the *Herald* continues: "The instruction in this subject also is practical as well as theoretical. Besides the scientific study of construction and materials, it comprises the study of building processes and of professional practice, as well as that of composition and design and of the history of the art. It is so arranged as to meet the wants, both of those who commence their professional studies at the beginning and of experienced draftsmen who desire to make up deficiencies in their training or to qualify themselves for undertaking the responsibilities of practice. The more strictly professional work begins with the study of the five orders and their applications and of architectural history; while, with constant practice in drawing, the students are familiarized with the material element of their future work by a course in practical construction, illustrated by lectures, problems and by visits to buildings. During the following years the subject of specifications and contracts is thoroughly gone over, and problems in construction of all kinds serve to fix in the memory the principles already learned and to supplement them by more advanced instruction. The students are continually practiced in architectural design. Each set of drawings is examined and criticised before the classes. In addition to the work in architectural design, and as an assistance to it, an efficient training is given in sketching, divided between exercises in water color and drawing in black and white. The lessons in color are given out of doors in the pleasant season. Those in black and white are devoted chiefly to the drawing of details from the casts, both of architecture and sculpture, belonging to the Institute and to the Museum of Fine Arts, but students are encouraged to form the habit of notebook sketching upon all occasions. In addition to these exercises evening classes are held during the winter season, and two evenings in each week are devoted to drawings from life, to which all students in the department are admitted. Instruction in the theory of fine art is given by lectures, the students of the department, by favor of the trustees of the Boston Museum of Fine Arts, being admitted free of charge to those given to the pupils of the school of painting connected with the museum, as well as to the use of the galleries; while, in addition to the regular courses, special lectures are given every year in the Institute itself, by gentlemen distinguished for their professional attainments, upon the arts more immediately re-

*Architectural Drawing Room.*



*Massachusetts Institute of Technology.—Civil Engineers' Drawing-Room.*

*Senior Civil Engineers' Drawing-Room.*

lated to architecture. The department of architecture is under the charge of Prof. Theodore M. Clark. Prof. Eugene Setang, associate professor of architecture, directs instruction in design. Mr. Herbert King, Jr., instructor in architecture, has charge of the drawing-room, and Mr. Frank H. Lord is his assistant. The lectures on water-color drawing and sketching are given by Mr. Emil Carlsen, and Mr. C. Howard Walker is lecturer upon decorative art.

## CORRESPONDENCE.

### Frozen Mortar.

*From* O. F. H., *Milan, Mo.*—In relation to the inquiry of "G. B.," in the March number, I will relate some of my experience. In the fall of 1884 I built a dwelling for myself and got so far as to have the mortar slaked, intending to complete the plaster-work before cold weather set in. Three days later, however, it commenced freezing so that I was compelled to delay plastering until spring. I then slaked more lime on the top of the old before it commenced thawing. I then commenced using the mortar. When the new was used up and that with it which had thawed, I cut into the remainder with an axe and thawed it, using a large iron kettle for the purpose, thawing just so much from time to time as was needed for use. The result was every way satisfactory. I have as good a job of plastering as there is in this part of the country, if not a little better.

*From* T. Y. A., *Titusville, Pa.*—Slaked lime after freezing is not good for plaster. It is entirely spoiled, for the frost disintegrates and changes the nature of the lime. Lime that has been frozen cannot be made available for plastering, even with fresh lime mixed with it. Further, it costs more labor to make the lime plastic enough to spread on the walls than the lime is worth. Even unslaked lime would lose its good quality for plastering if exposed for such a length of time to winter weather. Good fresh lime is required for good plastering. The best use to make of the heap of mortar that your correspondent describes is to spread it for a top dressing on a field of grass or otherwise use it as a fertilizer. No practical mason would undertake to employ it in house construction.

### Systems of Hand-Railing.

*From* "STEP-LADDER," *New Edinburgh, Ont.*—In common with many of your readers, I take a great deal of interest in the questions connected with hand-railing which from time to time appear in your paper. Your answer to "S. B." in the February number concerning the wreath for the plan that appeared in the August number for 1885 appears to me to need a little further explanation on the following points: 1. How is the plumb bevel for joint at newel-cap found, and how applied? 2. How to find the thickness of plank required? 3. How is the falling line of the wreath found, as it does not lie in the center of the plank? For stairs of this description the plan as presented is what Riddell calls entirely wrong, for by that authority we are told to take any portion of a circle less than its diameter and greater than a quadrant in order that the tangents on plan and elevation will conform with the desired falling line of rail. It is just here that the lameness of the system of tangents controlling the falling line of rail comes in, for in order to get the rail a proper hight above the winders, and at the same time produce a good effect at the newel, the elevated tangents and the center of falling line agree a long way off—so far off that I desire to make the following points against it:

1. It is necessary to lay out the stairs to suit the pitches of tangents.

2. That the falling line of rail is controlled by the pitch of tangents, and, consequently, in a measure arbitrary.

3. That the rail will not follow the nosing line of equal winders, but deviates when the center of rail is made to the center of plank.

4. That the solution of Fig. 12, August issue, 1885, is not a solution by the tangent system, inasmuch as all the joints are not made square to the surface of plank and tangents.

Although much has been written on the subject of hand-railing, I think something better is still wanted—something that is applicable to all the crooked places that present themselves in practice, and at the same time not destitute of that artistic quality so much desired nowadays. For such a system of construction we are waiting patiently, trusting that before long the science of hand-railing will rest on a firmer basis than it now does

*Answer.*—We are always pleased to have such letters from our subscribers as the above. Inquiry and discussion are the best means of mastering any subject. We shall attempt to answer our correspondent, but in doing so do not wish to stop discussion. We hope other stair-builders will see fit to express views on the points raised. Our corresponden asks, "How is the plumb bevel for joint at newel-cap found, and how applied?" To answer this and the two following questions, we refer "S. L." to the paper for August, 1885, also a few remarks which appeared in the November number, together with the illustrations from nature, as it were, which are found in the February paper. To fully understand a question like this requires close attention to the description, and perhaps also an attempt to cut such a piece out of wood. The thickness of plank may be determined approximately by applying the top bevel and square pattern on a board, then drawing a parallel line

*Determining the Thickness of Plank.*

line to show how thick a plank is required for the natural twist. The extra thickness at the lower end of wreath to form the ea e-ment will certainly not be more than the rise of the same which here is mentioned, 3 inches. In fact, the added thickness will be considerably less, and could be determined, but it does not pay to spend much time on it. If the plank at hand does not seem to be thick enough for all, glue on a piece part way up on the block to make sure. The falling line is not cut by any rule except that by which a writing-master makes perfect and beautiful letters. This off-hand art is always necessary in stair-building as well as in many other trades. The man who can work only by rule must always be a plodder.

There are cases, it may be, when a falling mold is necessary. If so you can make one and apply it in the old-fashioned way just as well with this system as with any other. After cutting the inside face of the wreath just bend in a piece of thick drafting paper, mark the butt joints and crease the paper at the top and bottom edges of the wood; then lay the paper down on your bench and draw the falling mold in the available space just as you want to. The plan proposed was given by a correspondent who asked how he could work the square-cut system and make a rail to fit it. In reply we gave the most practical method we know of, combining the ramp with the square-cut method of locating the joint. The result in this case was better than would naturally be produced by the square-cut method alone. Whether such a plan is right or not is an open question, unless Mr. Riddell's authority is to be taken for all time. The fact is that the form of stairs and the space they must occupy are usually controlled by the architect, and the stair-builder is expected to fill it up to the best advantage. Further, we are no more bound by the square-cut method to lay out the stairs to fit certain tangents than we are bound by any other method to get the stairs in good shape. It is, however, a source of convenience to know how to combine the stairs with the easiest method of getting out the rail, and it pays to be able to do it if we wish to save labor and useless expense.

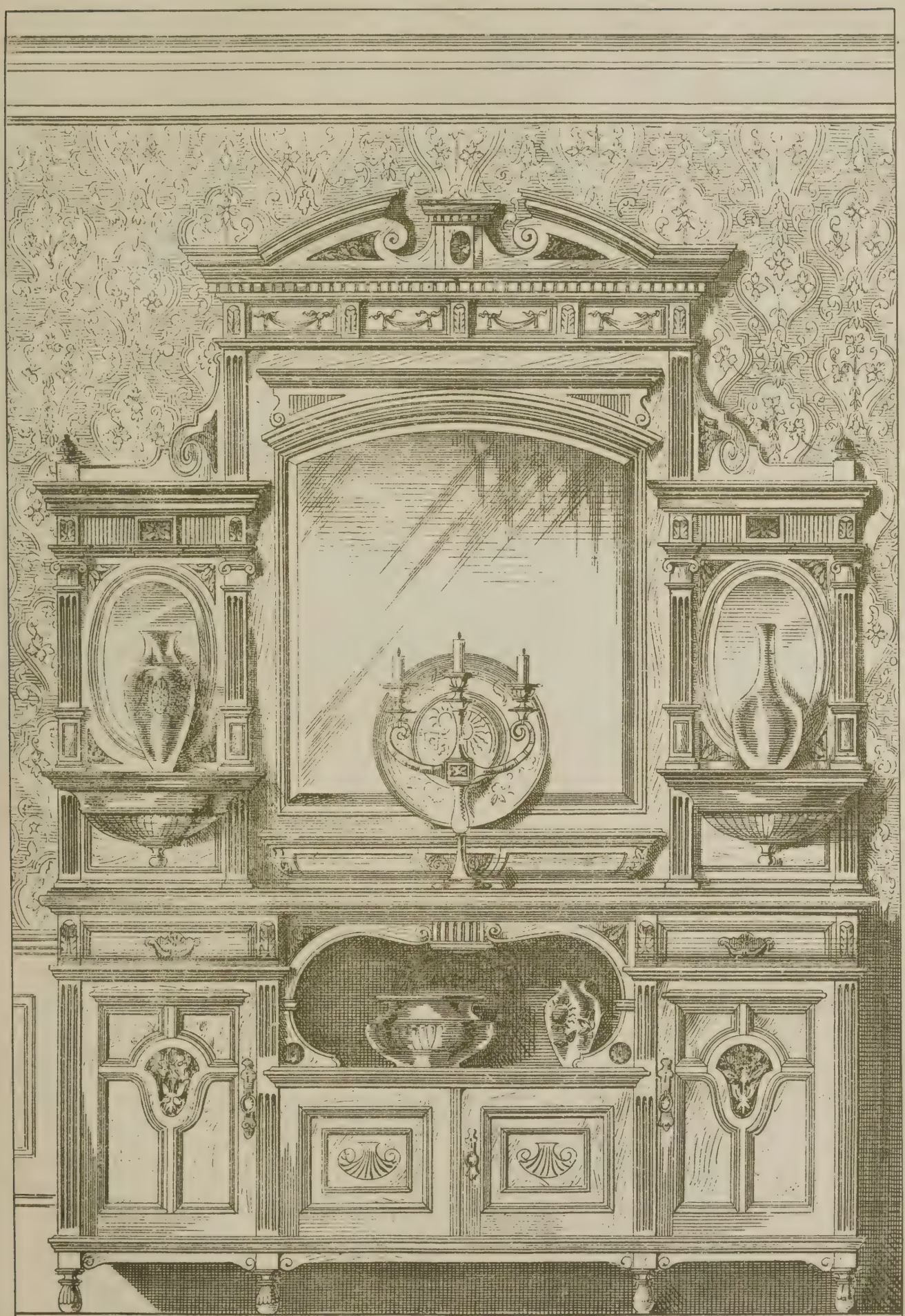
With the method of getting out the rail we have been explaining, if we want a good rail we must have a good string, and to have this there must be some evenness and consistency in laying out the straight steps and winders. Certain forms of landing and starting with stairs make a bad-looking rail, no matter how we try it. For example: the landing of stairs referred to by "S. B.," in the interview with his friend, published in the issue of November, 1885. The fact that the elevated curve lines produced by the square-cut method are plane curves instead of spirals has always been known, and, as here, sometimes objected to. But this fact, though it appears in the theory, is largely overcome by the genius of the workman in cutting out the rail. Where two wreath-pieces are bolted together before working off the top and bottom this is inevitably done without the workman trying to, except that he tries to make the general curve look even. Thus the hight is pursued about equal over the line of nosings. As to our not solving the question of Fig. 12, August paper, by the tangent system, we may here say that we do not feel bound to technicalities, but try to reply in a way that will do the most good. No system will ever be found to fit every crooked place which a stair-builder has to encounter. It takes a man of brains to do that, and to make and help on such men is the object of our articles.

### Queen Anne Style.

*From* W. H. H. C., *Northfield, Vt.*—There has been a great deal said from time to time about Queen Anne and other modern styles of architecture. If I was called upon to build a house in the Queen Anne style, or, for that matter, in any other of the new styles of architecture, where could I obtain a book or a paper that would give me the information I would need in completing my work? Where could I find an authority that would be able to afford me the desired information? I have asked with respect to this matter in various directions, and so far have not found any one who could give me any information on the subject. On the other hand, if I was required to build a portico in the Doric or Ionic style, the dimensions being given, there would not be much trouble in working out the proportions, especially the hight of column and entablature. If my directions were to work in the Queen Anne, Elizabethan or Romanesque styles, where or who would be the authority to determine whether the resulting effort was one thing or another? Would a house with two gables be in the Queen Anne style, or to entitle it to this name must it have 20 gables or more? What is necessary in order to entitle a building to the name Queen Anne? I am sure that a man would want more light on this subject than he could get from Ruskin's "Seven Lamps of Architecture."

*Answer.*—Our disposition is to reply to our correspondent's last question with the curt phrase, which perhaps would be considered highly appropriate, "We give it up." The facts of the case are that architects and art critics have employed terms of late years in a sense in which they are not explained in any of the books. Ruskin's "Seven Lamps of Architecture," as valuable a work as it is, fails to shed light on many of the inconsistencies and incongruities of the crazy quilt architecture of the present day. Queen Anne, Eastlake, Early English, Colonial, Elizabethan and still other terms that might be mentioned have a significance of their own; but in addition to this they are used in a sense that it is very hard for those outside of a select circle to gain an idea of. It is scarcely necessary for our correspondent to trouble himself in finding out the peculiarities of Queen Anne architecture. The craze which has been designated by this name is on the wane, and unless we all die early we shall live to see something else take its place. It is no longer as prominent on the boards of leading designers at present as it was a very short time since. Our correspondent's question is a pithy one and it affords food for thought.

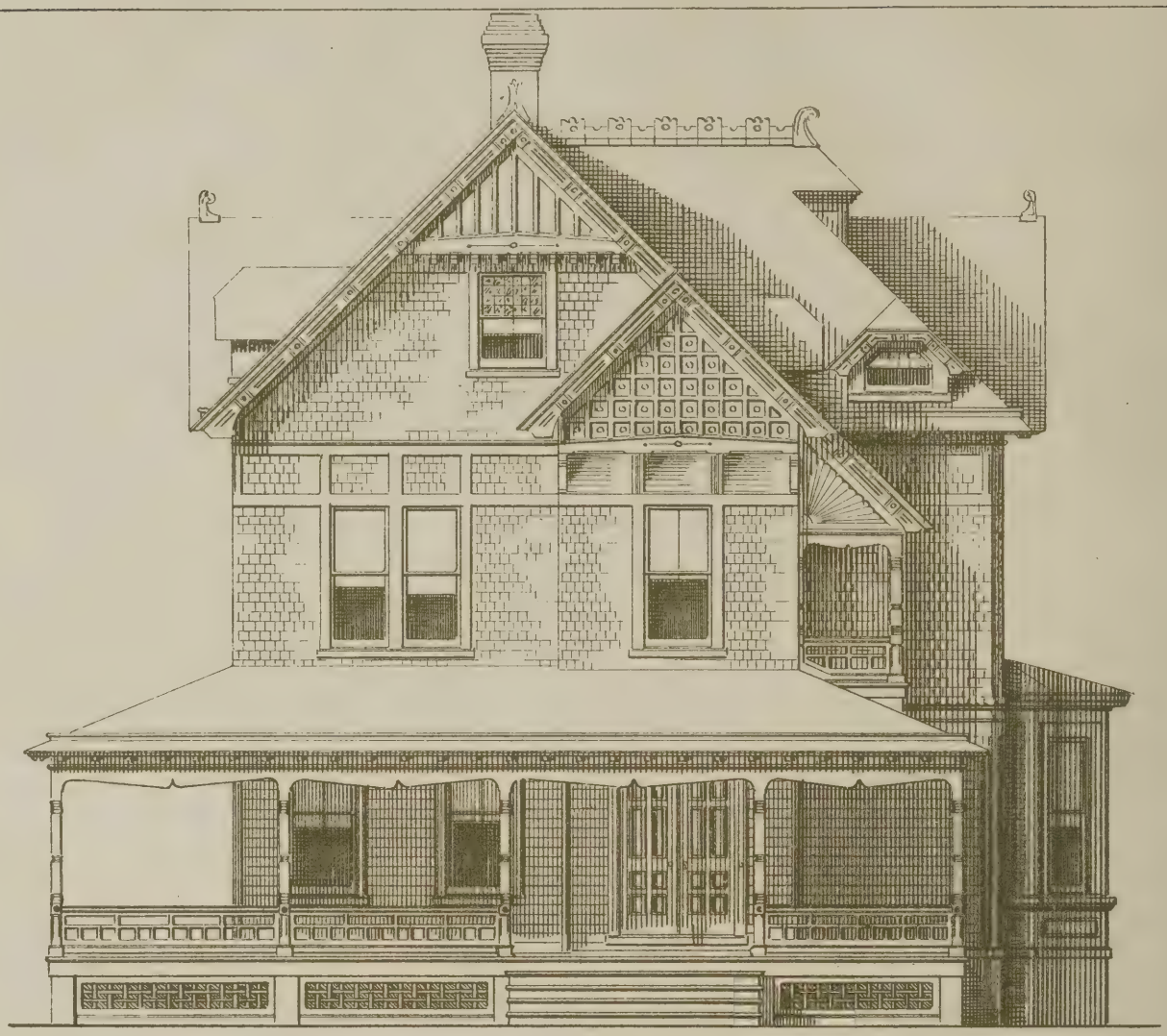
PLATE XVII.



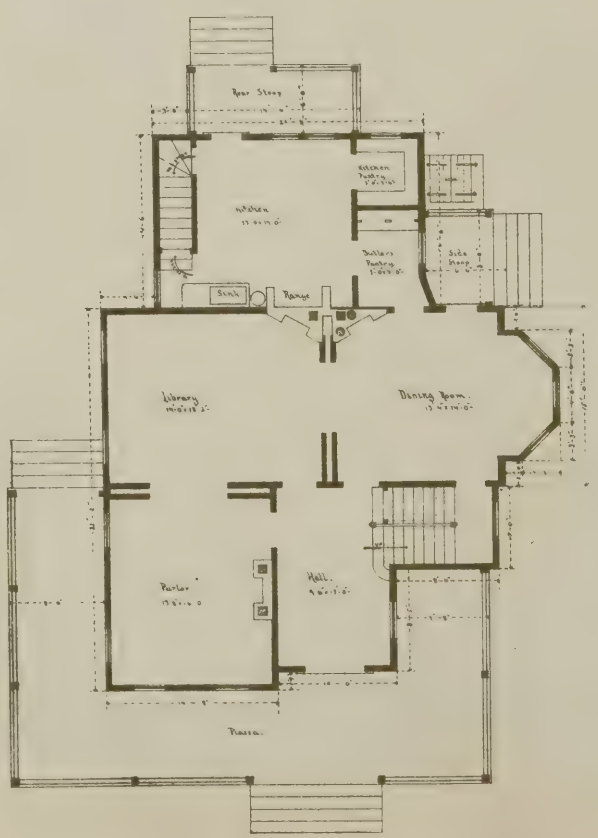
# DESIGN OF SIDEBOARD.

Scale, 1 Inch to the Foot.

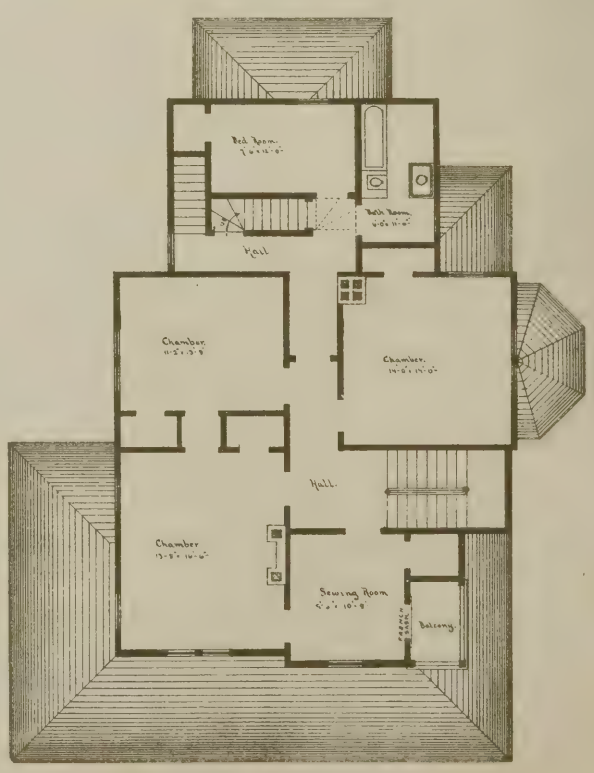
PLATE XVIII.



FRONT ELEVATION OF STUDY SUBMITTED IN SEVENTEENTH COMPETITION BY "CUI BONO." Scale, ⅛ Inch to the Foot.



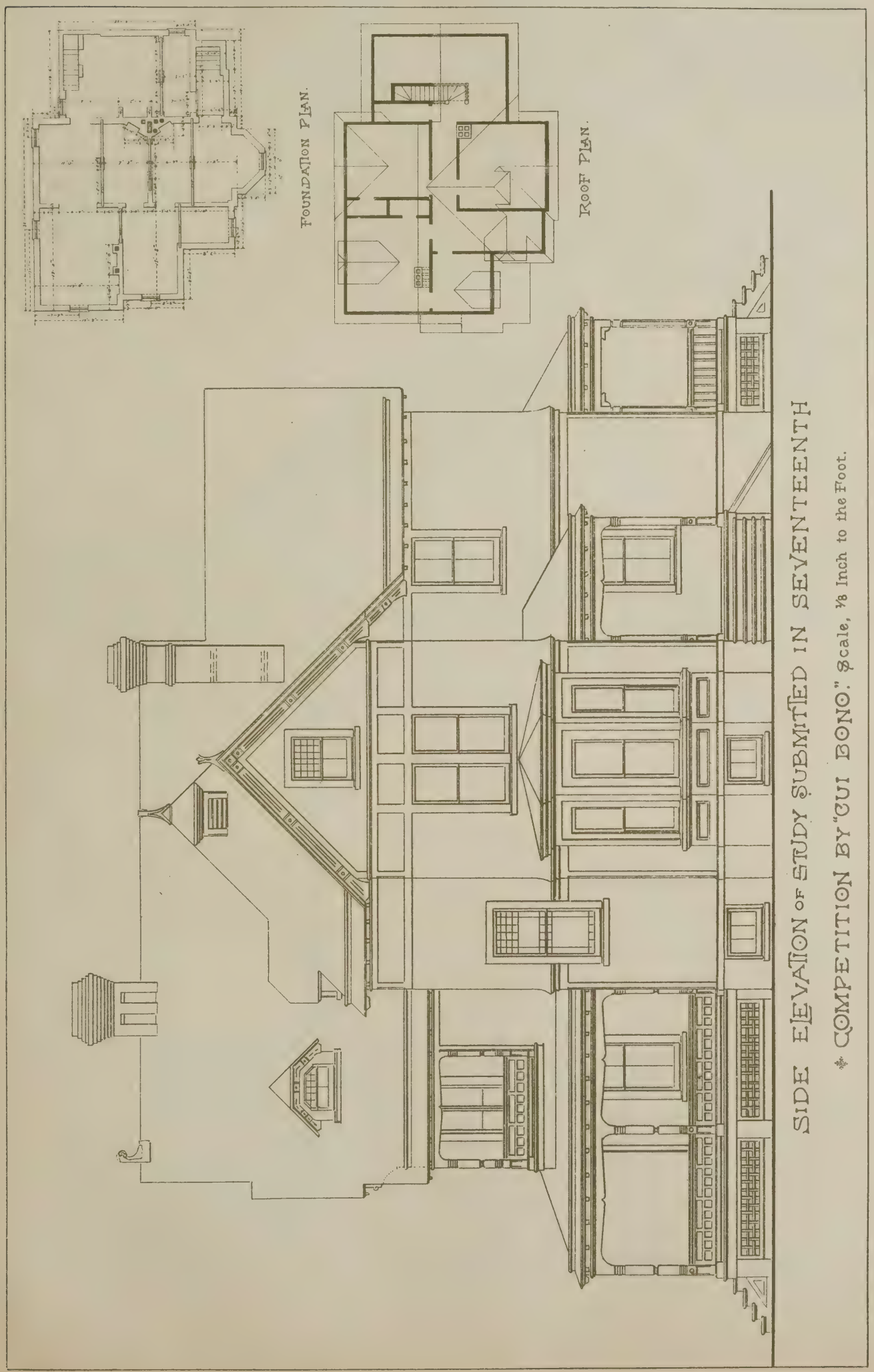

FIRST FLOOR PLAN.



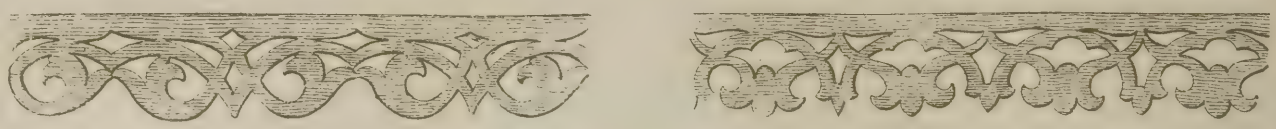

SECOND FLOOR PLAN.

*Scale, 1/16 Inch to the Foot.*

PLATE XIX.




SIDE ELEVATION OF STUDY SUBMITTED IN SEVENTEENTH COMPETITION BY "CUI BONO." Scale, ⅛ Inch to the Foot.



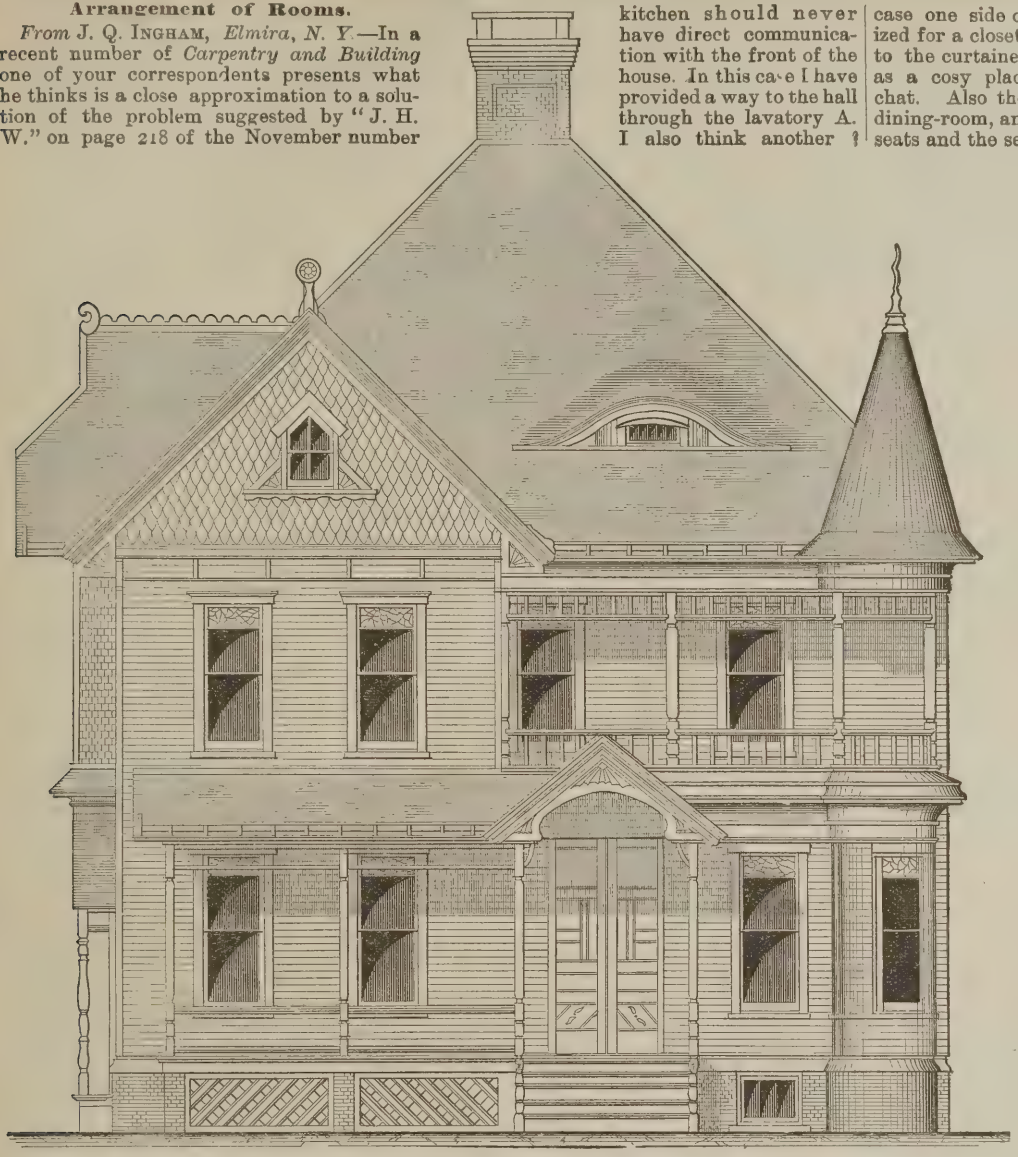
2 DESIGNS FOR SAWN SCROLL WORK.

2 DESIGN FOR LAWN PAVILION.

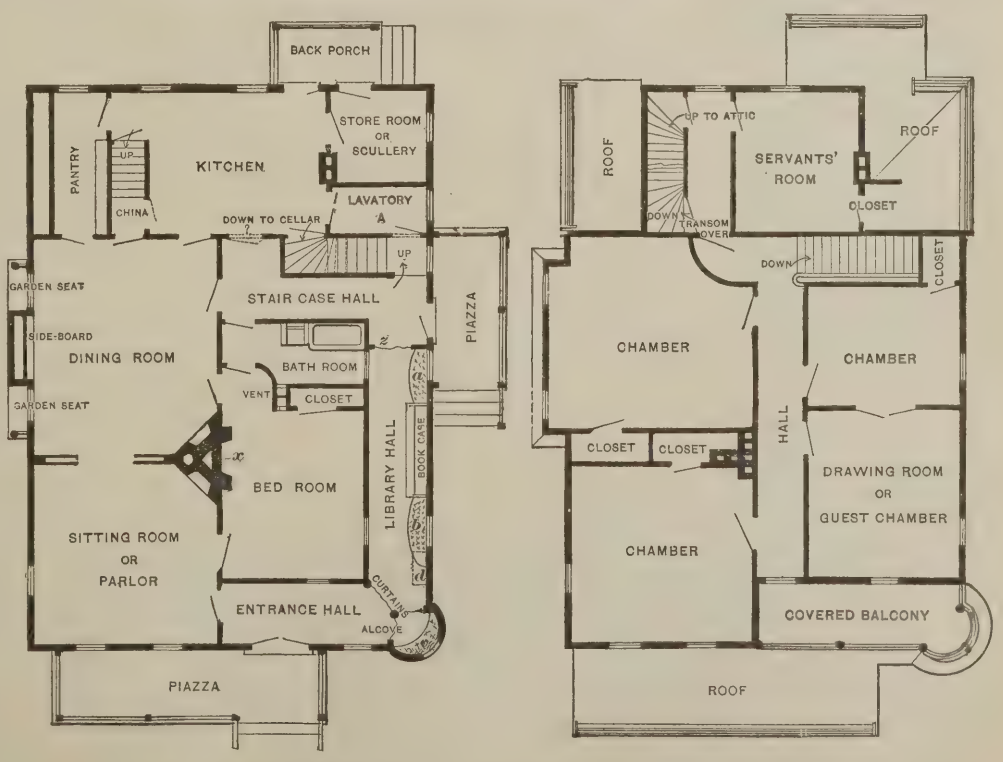
Approximate Scale, ⅜ Inch to the Foot.

### Arrangement of Rooms.

*From* J. Q. INGHAM, *Elmira, N. Y.*—In a recent number of *Carpentry and Building* one of your correspondents presents what he thinks is a close approximation to a solution of the problem suggested by "J. H. W." on page 218 of the November number of last year. When I first saw "J. H. W.'s" communication, I thought that he was asking more than could be given at all wisely, although I saw at a glance that it could be done in one way or another. Having my attention called to the question a second time, I set myself to work to see what I could do with it. Inclosed I hand you blue prints of two floor plans and also an elevation which is the result of my work. I have come to the conclusion that the plan is not only novel, but feasible, and really very economical, comfortable and convenient. Withal it is elegant. It would seem at first, perhaps, that too much room is devoted to halls, but, when you remember that halls may be made to answer all the purposes of library and reception rooms, this objection vanishes. My arrangement provides for ample light and very perfect ventilation of the bedrooms and bathroom by a fireplace, and also by floor and ceiling ventilation through ducts connecting with a special warm flue (not a smoke flue) in the chimney. If desired, a door might be substituted at *z* for the curtains shown, in which case the front hall and library could be warmed the same as the other rooms by steam or furnace heat. I have placed a ? between the hall and kitchen for the reason that I think the kitchen should never have direct communication with the front of the house. In this case I have provided a way to the hall through the lavatory A. I also think another ? might well be placed in the door between the kitchen and the dining-room. A passage might be made by the two doors through the place marked "china." In this case one side of the pantry might be utilized for a closet. Special attention is called to the curtained and window-lighted alcove as a cosy place for sitting to read and chat. Also the recessed sideboard in the dining-room, and to the window and garden seats and the second story covered balcony. I shall be glad to have the readers of *Carpentry and Building* give this solution of the problem careful scrutiny.



*Study in House Planning, by J. Q. Ingham, Architect.—Elevation.—Scale, ⅛ Inch to the Foot.*



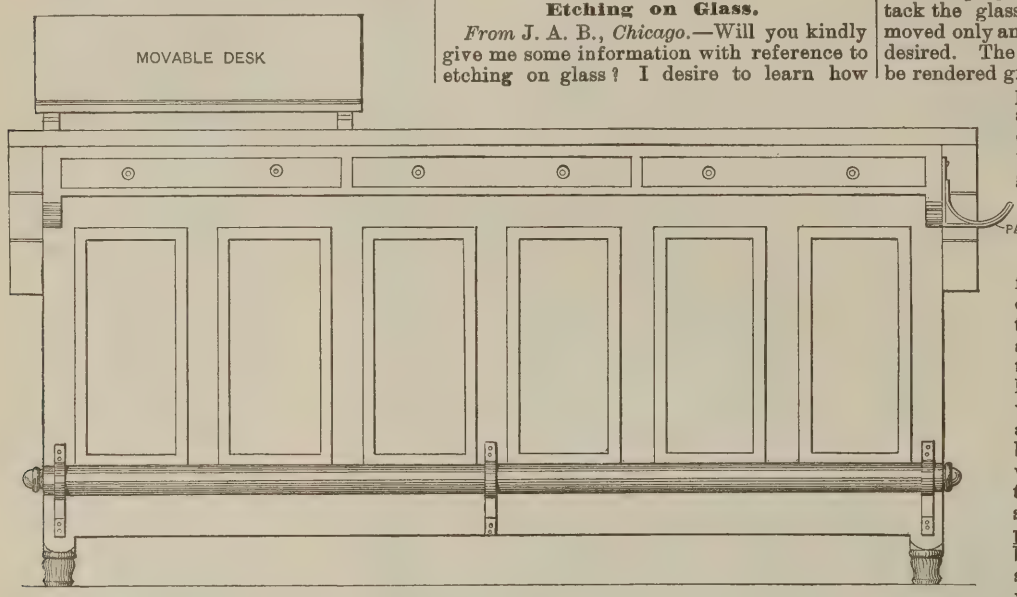

*First and Second Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.*

### The Tangent System.

*From* J. A., *Cedar Rapids, Iowa.*—In looking back through the volumes of *Carpentry and Building* I notice in the February number for 1884 a sketch and letter from "W. H. C.," Orillia, Ont., entitled the "Tangent System in Hand-Railing. Your correspondent seems to have a very poor opinion of the tangent system. For my part I think it the only true system for use in stair-building. In my experience I have found it everything that was required to make a good finished rail. If the tangent system is a faulty system it would not be almost universally adopted. In a conversation with a German stair-builder a few weeks since I was told that while in the old country he considered himself No. 1 on hand-railing. He found on securing work in New York that he was very deficient in comparison with American mechanics. He said that, whereas in Germany it took a log out of which to work a wreath, in this country a wreath was got out of a plank only as thick as the required wreath is wide. Perhaps "W. H. C.'s" system is like the one this German spoke of. However, if he has a better system than the tangent system, I hope he will make it known through *Carpentry and Building.*

### Drawing Table.

*From* W. C. HOFFMEISTER, *Knoxville, Tenn.*—I inclose a design for a drawing table which perhaps may be of sufficient interest to warrant publication in *Carpentry and Building*. I am a young architect, just commencing on my own account, and, having very modest quarters, I felt the need of a *mullum in parvo*. On the drawer front, as shown, are six drawers extending back the full depth of the case. The upper long drawer is for drawing papers, &c. The three middle ones are for drawings to be kept flat, and the two lower ones are for general catch-alls. The 12 pigeon-holes above drawers are for keeping drawings in rolls, The draftsman's front is paneled up entirely, with the exception of three small drawers in the extension at the top. These drawers are for instruments, water colors, and indicate moldings, patterns, &c. They are divided into compartments as required for the various contents. The top is not fastened to the case, but instead is attached to three battens, ⅞ x 3inches in size, with round-head wood screws and washer. The battens are slotted, so as to allow for expansion and contraction. The two outer battens fit up snugly against the inside of frame to keep the top in position, and the top is groovod lengthwise of the boards, with sockets about 3 inches apart, and extending halfway through, in order to give the battens control and to prevent cupping. The part of the top projecting over the drawer is hinged to the main part with three back-flap hinges with astragal joints. This part is supported by an automatic contrivance—that is, a ½-inch iron rod with a right-angle turn on each end, the upper end working in an eye screwed to a fall leaf, and the lower end in a slotted plate screwed to the table frame. This fall leaf answers as a shutter to the pigeon-holes, and when required can be used as an extension to the table, being very convenient when making full-size details. The paper rack is made of a single piece of iron 1 x ⅞ inch, bent and set to the required shape. It is connected to the case by holes and slots in the upper arms working over the heads of screws in the case, so as to be taken off at will. The movable desk on top of main table is to be used for general drawing purposes, and is adjustable as required by the hinged battens and iron dog, working in holes as shown. This part can be taken off and put out of the way when necessary. The idea of the foot-rest was borrowed from the table designed by Mr. W. B. Hanton, illustrated some time since. The case is of clear, bright yellow pine, oil finished. The top is of soft yellow poplar, unfinished. The paper rack and other similar parts are bronzed to match the drawer-pulls. The case was made by Messrs. Galyon & Baker, house joiners, of this city, and cost, including hardware, some $54. I would be glad if some reader of *Carpentry and Building* would suggest some way to finish the top of such a drawing table, so as not to effect drawing papers nor the working of T-squares, &c

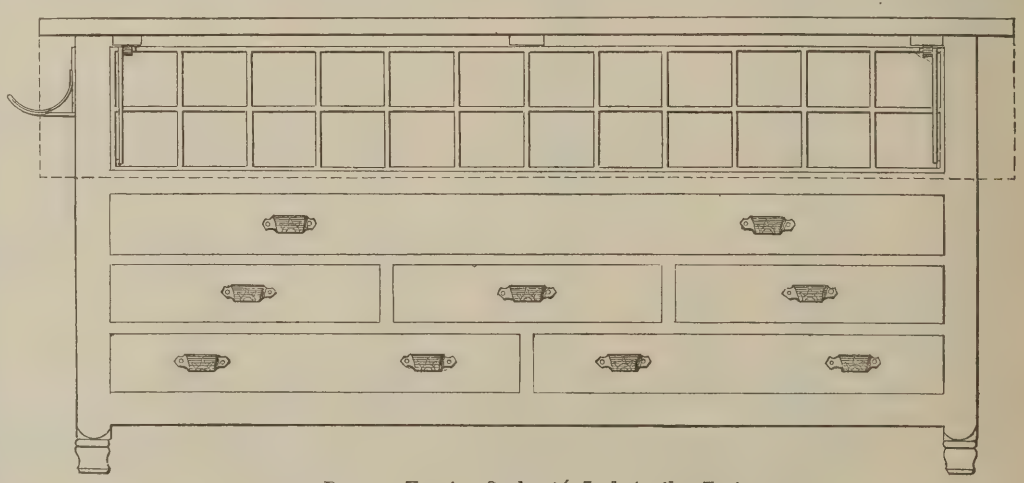



*Design for Drawing Table, by W C. Hoffmeister, Knoxville, Tenn.—Draftsman's Front.—Scale, ⅜ Inch to the Foot.*

### Etching on Glass.

*From* J. A. B., *Chicago.*—Will you kindly give me some information with reference to etching on glass? I desire to learn how various ornamental patterns, signs, decorations, &c., are obtained on glass.

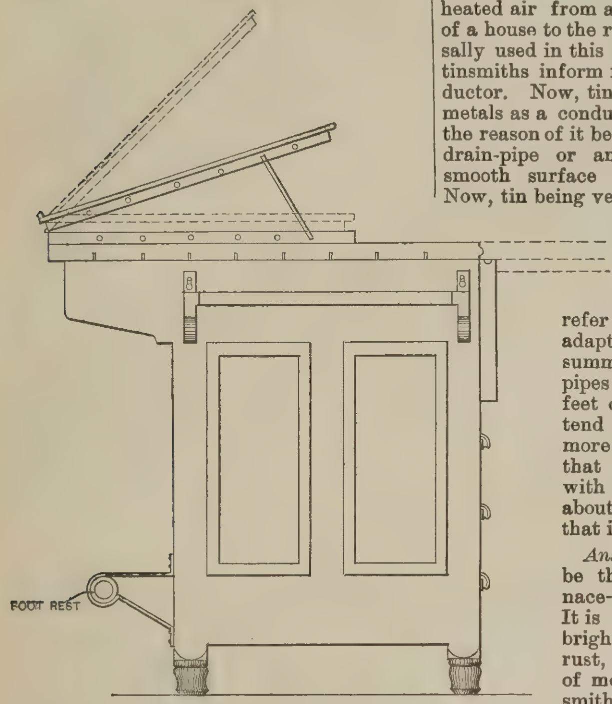
*Answer.*—Orninary etching on glass is described by Spon as follows: "Glass is etched by hydrofluoric acid gas, or by liquid hydrofluoric acid. The acid for this purpose is obtained by treating fluoride of calcium, Derbyshire spar, with sulphuric acid in a leaden vessel, as we shall presently describe. The gaseous hydrofluoric acid has the property of producing a surface which represents ground glass in its appearance, but the liquid acid produces just the contrary effect, and dissolves away the glass, leaving the surface polished and clear. Etching glass, therefore, consists of two operations—etching by the gas and producing a dull, opaque surface, and etching by the liquid and producing a surface which is bright and clear. 1. Gaseous hydrofluoric acid is the product of the action of sulphuric acid and fluoride of calcium. Take powdered fluoride of calcium, two parts; sulphuric acid, three parts. The powdered fluoride is placed in a leaden dish or shallow box, the sulphuric acid poured upon it. By means of a stick the acid is made into a paste with the powdered fluoride; the mixture only requires to be warmed to evolve considerable fumes of gaseous hydrofluoric acid. These fumes are disagreeable; the experiment should therefore be conducted in the open air or under a chimney. The glass plate to be etched is covered with wax by gently warming the glass sufficient to melt wax and rubbing it with a piece of white wax until it is covered by a thin layer; it is then allowed to cool, and the waxed surface is etched by a graver. The sheet of glass thus prepared is used as a cover for the leaden vessel containing the materials, with the waxed side presented to the escaping fumes. These fumes will attack the glass where the wax has been removed only and produce the dull appearance desired. The entire surface of the glass can be rendered ground in its appearance by exposing it to the fumes of the acid gas in its ordinary condition, unprotected by the wax. The production of the gas is accelerated by the warmth of a hob or of a spirit lamp applied to the bottom of the leaden vessel for a few moments. 2. To obtain the liquid acid, place the mixture named above in a leaden retort, and conduct the gas from the retort into a leaden bottle containing some water, so long as the water absorbs the fumes. The water becomes thus highly charged with hydrofluoric acid, and this liquid is to be used in the second process. The glass plates are to be prepared as before, with the addition of a small wall of wax or putty, which is to be formed round its edges; the liquid acid is to be poured upon the etched waxed surface and allowed to remain until a sufficient depth of etching is produced. 3. To produce a colorless pattern on a colored-glass ground, proceed as for etching an ordinary pane of glass, but the operation is conducted upon the surface of flashed glass—that is, glass which is simply covered on one of its sides with a color, and which is not stained throughout. This flashed glass is a cheap imitation of stained glass; the thin coating of colored material is soon dissolved by the acid, so as to leave a transparent or ground-glass pattern on a colored-glass ground, according as the process is conducted by means of gaseous or liquid hydrofluoric acid. The acid must be carefully handled, as it attacks the skin and produces stubborn sores which are not easily healed, and it must be kept in india-rubber bottles, as it will dissolve glass."



*Drawer Front.—Scale, ⅜ Inch to the Foot.*

One of the most generally employed methods of etching at the present time is known as the sand blast. For the sand-blast process a special form of apparatus is used, which we believe is covered by patents. The process is based upon the principle that if a stream of sand be made to fall through a

vertical tube open to the air at the top, and the falling sand and air be received in a suitable closed vessel below, a jet or current of compressed air can be obtained. The entire surface of a piece of glass may be roughened by this means, or, if the parts are protected by a suitable medium, only the exposed portions will be abraded. By this means very delicate patterns may be produced. In this connection it should be re-




*Design for Drawing Table.—End Elevation.—Scale, 3/8 Inch to the Foot.*

marked that the variety in depth of incision which gives the chief beauty to engraved glass cannot be gained either by etching or by the sand-blast process.

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### Calculations for Estimates.

*From* A. B., *Port Chester, N. Y.*—Will you please inform me, through *Carpentry and Building*, how to figure the number of bricks required to build 1 foot of wall, or, in other words, the rule used to find the number of bricks in a wall of any length, breadth or thickness. Is there a book which would be useful in instructing me how to estimate on buildings?

*Answer.*—Brick commonly measure 8¾ inches long by 4¼ inches wide by 2¾ inches thick. Accordingly, allowing for the usual mortar joint, it will be found that a 4¼-inch wall requires for each superficial foot seven bricks. In the same way a 9-inch wall requires 14 bricks, a 13-inch wall 21 bricks, an 18-inch wall 28 bricks, and a 22-inch wall 35 bricks for each foot superficial. Add seven bricks for every half-brick additional thickness. By this rule it is necessary simply to obtain the superficial surfaces of the wall, and multiply by the number of bricks required for the thickness, as above given. For example, a wall 50 feet long, 20 feet high and 13 inches thick would require $50 \times 20 \times 21 = 21{,}000$ bricks. The usual rule among bricklayers is to deduct all openings for doors, archways, windows, gateways and other large spaces. Flues, ends of joists, girders, sills, lintels and boxes of sash frames are generally counted solid. The waste of material and time in working around these places more than makes up the difference. Answering our correspondent's question about books on estimating, we would say that there are very few that give particular attention to mason's work, although nearly all that treat upon this subject give brief tables pertaining to this important department of building. Among those that it might be desirable for our correspondent to examine are Hodgson's "Builder's Guide and Estimator's Price Book," the "Practical Estimator," and Kidder's "Architects' and Builders' Pocket Book." The latter enters into a discussion of different forms of masonry construction, stability of arches, &c. On the "Handy Estimate Blanks" there is printed a table that will prove of value in calculations of this kind.

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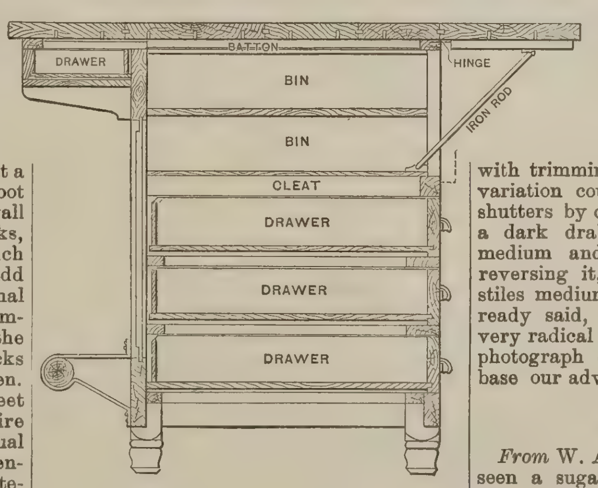
### Furnace-Pipe.

*From* J. H., *Ipswich, Mass.*—Please inform me what is the best kind of a pipe to convey heated air from a furnace in the basement of a house to the room above. Tin is universally used in this part of the country, and tinsmiths inform me that it is the best conductor. Now, tin being low in the scale of metals as a conductor of heat, I cannot see the reason of it being any better than glazed drain-pipe or any material which has a smooth surface which prevents friction. Now, tin being very thin, if used in a very large, cold cellar, would waste more or less of the heated air within the pipe. The cellar in the house to which I refer is unusually cold, and is adapted to keeping butter in the summer time without ice. The pipes from the furnace are 10 feet or more in length. I contend that tin pipes will lose more or less of the heat and that they should be covered with woolens. I care nothing about rust, for I can prevent that in many ways.

*Answer.*—We believe tin to be the best material for furnace-pipes for several reasons. It is cheap in first cost, has a bright surface, does not readily rust, and there is a minimum of metal about it. In the tinsmith's assertion that tin pipes are the best pipes to conduct heated air from a furnace, and in our correspondent's use of the word "conductor," there are two different ideas. The tinsmith, we imagine, used the term in the sense of conveying the air through the pipe. Our correspondent, on the other hand, employs the idea in the sense of conducting heat. In the sense in which the tinsmith used the term the poorer conductor tin is the better for the purpose, because there is less loss of heat from radiation. Accordingly it will be seen that there is no great discrepancy between the two ideas. The objection




*Cross-Section.—Scale, 3/8 Inch to the Foot.*

to employing glazed tile for the purpose of conducting hot air lies in part in the absorption of heat by the body of the tile. There is a large quantity of material to become heated, and the heat so taken up would be lost, or, in other words, it would never get to the rooms to heat which is the object of the furnace. Our correspondent is quite right in asserting that considerable loss will occur on account of radiation from the tin pipe. The same is true with reference to the furnace itself. If he desires to avoid heating his cellar or losing heat in the cellar it will be well to jacket the pipe and the furnace also—that is, in the event of the latter being a portable or iron incased furnace. If jacketing is decided upon we would advise something else than woolens. It would be strange, indeed, if the pipes, under certain circumstances, did not become sufficiently heated to scorch the wool, which, of course, would be a disagreeable circumstance. There are special preparations, however, of felt used for this purpose which we believe are entirely safe, and perhaps it is to something of this kind that our correspondent refers. An asbestos packing would also be serviceable. It is unusual, however, to pack furnace-pipes in this way, but there is no objection to doing so. We hope our correspondent in arranging his heating aparatus has taken the pains to secure a good supply of fresh air. In no event should the dead air from the cellar be depended upon. The connection to the furnace from the outside should be of a character to cut off all entrance of cellar air.

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### Painting a House.

*From* J. C. W., *Pictou, Ont.*—Will you kindly advise me as to the most agreeable and harmonious colors for painting my house? The structure has been built eight years and is 1½ stories in hight. It stands end to the street The house is in one of the suburban streets of the town, with plenty of space around it. I would like to secure the best arrangement of colors, and feel certain that your cultivated taste and wide experience will afford suggestions that will be of assistance. I intend to build a veranda on the end next the street and a kitchen in the rear before the painting is done in the spring.

*Answer.*—We are much obliged to our correspondent for his expression of confidence in our taste, but fear that he has given us too meager particulars to enable us to be of much assistance. He evidently has in mind a combination of colors, and these to be effective must be managed with direct reference to the constructive features of the buildings. Without knowing something of the way his woodwork is managed, the shape and style of his cornice and window trimmings and other similar particulars, it would be very difficult to indicate any scheme of color that would be adapted to the purpose. Speaking in the most general terms, and assuming that the house is somewhat old style in architecture, from the time that it has been built and from the description our correspondent presents, we think that an arrangement of drabs would probably be as satisfactory as any. Assuming that there are trimmings by painting, of which the general effect can be varied, we would suggest that a yellow drab be used for the body, with trimmings of dark drab. Still further variation could be secured in the window shutters by combining a medium drab with a dark drab, painting the slats of the medium and the stiles of the dark, or, reversing it, painting the slats dark, the stiles medium and the casing dark. As already said, we cannot suggest anything very radical in character without at least a photograph of the building upon which to base our advice.

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### Sugar Refinery.

*From* W. A., *Baxley, Ga.*—I have never seen a sugar refinery, but would like to know the cost, and, further, if it would pay to construct one on a small scale. Syrup is very plenty in this country at a comparatively low price. I have an idea that if the cost is not too great it would pay to have a sugar-house here.

*Answer.*—Although we are not experts in sugar refining, we are disposed to discourage our correspondent from the enterprise that he suggests. Sugar refining, of all the industries with which we have any acquaintance, is employing large capital, and all the operations are of a character to be economical only when carried on on the most extensive scale. We are informed that sugar refiners think they are doing well when a margin of $\frac{1}{10}$ cent per pound on the manu-

factured product is secured. It must be evident, under these circumstances, that a very large business must be done in order to secure satisfactory returns. We do not think sugar refining can be profitably conducted on a small scale.

### Two-Story Frame Block.

*From* A. L. W., *Carbondale, Pa.*—I should be glad to see published in *Carpentry and Building* plans and elevations of a two-story frame block to accommodate four families.

*Answer.*—The study in the planning of village tenements by Mr. Lape, published on another page of this issue, very nearly complies with our correspondent's request above.

### Building Warm Houses.

*From* D. L. M., *Union City, Mich.*—I very seldom write for publication, but I am disposed to answer the question offered by "L. S. W." on page 55 of the March number. He wants to know how to build a warm house, and do it economically. My reply is simply this, use paper. I will explain in detail. If he does not care to use sheeting, let him set the studs 16 inches apart, and over that put the paper running up and down on the outside. Put a lath on the paper up and down on every stud; nail the siding to the lath. By this construction there is secured an air chamber ½ inch in space, which is as good as a 4-inch space in a brick wall, if not much better. After laying the roof-boards, put tarred paper over them, running strips of paper the length of the roof. Arrange the paper so that one whole sheet will cover the ridge, one-half turning down on each side. This will do more to keep the heat in in the winter than almost any other construction that can be named. On the other hand, it is equally serviceable in keeping out the heat in summer time. The coolest rooms in the house in summer will be those next the roof, while the warm rooms in winter will be upstairs.

Did any reader of *Carpentry and Building* ever look out of his window on a winter morning and see his neighbor's house all covered smooth with snow? Did he ever look again an hour later and ask about the boy that had been throwing snowballs on to the roof? No boy could be discovered, but, looking again still later, more holes in the snow on the roof would be observed. What is the cause of such phenomenon? Nothing but escaping heat. Warm air passing through the holes in the roof joints produced the effects mentioned. From this it is evident that the house in question has no paper under the shingles. At least one-third of the heat that is being produced in the stoves or furnaces in that house is being lost. Paper under the shingles will save a large part of it. With reference to the desirability of using paper, I would say that I prefer paper under the shingles of my roof to having it under the siding, if I can have it only in one place. There is not half as much cold goes through the sides as goes through the roof in a building of ordinary construction. A house papered as above described can be warmed in winter with 40 per cent. less coal than a house in the same exposure constructed without it.

*From* J. B., *Black River Falls, Wis.*—I notice in the March issue a letter from a correspondent asking about the best and most economical plan for building houses to secure warmth. The way we do such work in this cold country is to sheet upon both sides of the studding, using very common lumber. Over this we put paper under the siding and finish the inside with plaster. We use a different kind of siding in this section from any I have ever seen used in any other part of the country. We take common inch lumber and groove it on both sides, so placing the groove that the lumber shows just the same as though ½-inch siding was used. A much warmer house is secured by this construction. The reason we use this siding is, in the first place, that we think it is better and the lumber that may be employed is much cheaper than would be required for other styles. We first dress the lumber and then run the groove so that it will take out just one-third of the edge. It does not matter what side of the piece goes against the studding. In using this siding we set out frames as we go up with the siding.

*From* J. McG., *Kalamazoo, Mich.*—In regard to the inquiry of "L. S. W.," published in the March number, I will describe a house that I built for myself last season. I employed back plastering in order to secure warmth. While the winter which has just closed was not a very severe one, there was enough cold weather about it to test it to my satisfaction, and I feel confident that the building is as warm as if I had used a more expensive material. I sided the house without using sheeting, and nailed the furring (2 x 2) to the studding at right angles, placing it 16 inches from the centers, and over this I lathed vertically. This plan saved time in sawing lath, and divided the inclosed space into squares of 16 inches, which made drafts impossible. The mortar used for plastering was allowed to stand until it became very tough, and was then put on ¾ inch in thickness. The inner space was cut off at the second floor and attic, which further prevented drafts. The plastering on the inside face of the studding was brought down to the floors and close up to the window frames. The object was to make an air-tight house, and in a manner make it fireproof. As the house is built a fire could not spread very rapidly through the outside walls. The cost was very little more than it would have been had the building been sheathed on the outside. The results, however, are far more satisfactory.

*From* S. S. B., *Appleton, Wis.*—In this section of the country, in order to secure warm houses, we sheet upon the outside of the studding with 6-inch matched stuff. We cover this with building paper, and then over it in turn put on our siding, shingling, &c. On the inside of our outer walls we put an underlining of paper. We cut pieces the same size as the studding, and put them between the studding at the middle of each story and at each floor above the ground floor. We then cut tarred building paper 2 or 3 inches wider than the space between the studding, and turn the edges at right angles, so that it will go between the studs. We put the paper up and down between the studs, and, to hold it in place, we nail lath over the edges. With the circulation interrupted by pieces put in between the studding, we obtain a wall having many dead air chambers. The result is a warm house, secured with comparatively little expense. Another method that I have tried with success is to use double thickness of siding, arranging the lap so that an air space is obtained between the layers of siding. Old houses can be improved and made much warmer by siding the second time, placing the new siding directly over the old.

*From* J. S., *Ruthven, Iowa.*—I suggest sheeting up outside of the studding, the sheeting to be laid with good shiplap. Cover over the sheeting with building paper, and then apply first-class siding well lapped. On the inside lath, between the studding and plaster. Plaster in the usual way for the finish of the rooms. This construction forms two good air chambers, and makes the walls resist the cold to better advantage than if they were filled in solid. This construction give excellent satisfaction in this cold Northwestern country.

*From* W. B. R., *Hastings, Minn.*—A correspondent asks, in a recent number of *Carpentry and Building*, how to make the walls of frame house resist the cold. In the climate of Minnesota this is a question that is constantly arising. The most common plan in use is back plastering. Paper is employed to an extent unknown in the East. Almost every building is covered with heavy building paper and sometimes with paper saturated with coal tar. Back plastering and paper are both good in their way, but the filling of walls with sawdust is perhaps a better way than back plastering. It is well known that the ice cannot be better protected than by the use of sawdust. An air space—or, in other words, a hollow wall—does not prove as effectual a non-conductor as when the space is filled with mineral wool, sawdust or some similar substance. In a damp climate perhaps sawdust would not dry out or remain dry.

*Note.*—We are not prepared to advocate the use of sawdust in the way that our correspondent mentions. Wherever dampness occurs, decay of the vegetable fibers would set in and the result would be anything but a healthy house. Mineral wool and sawdust are hardly to be compared, since mineral wool is not liable to any of the objections which pertain to sawdust. We should expect sawdust in the course of time to give a great deal of trouble on account of decay and by reason of harboring vermin.

*From* T. Y. A., *Titusville, Pa*—In reply to the inquiry of "L S. W.," Plain, Ohio, I would say that the best plan for building a comfortable house is to fill it with brick between the studding of the frame. Use 2 x 6 inch scantling and build up the brick wall between the center of the scantling, so as to leave a double air space. This is much better than sheeting with boards. Use sawdust for filling in between the joists of the lower floor. This will make the house retain heat in winter, and will render it cool in summer. Sheeting with boards on the inside only hurts the plastering and does not give any extra comfort.

### Diameter of the Brooklyn Bridge Cables.

*From* J. A. L., *Montgomery, Ala.*—Please inform me, through the columns of *Carpentry and Building*, what the diameter of the principal cables that sustain the Brooklyn Bridge is.

*Answer.*—The four cables which support the Brooklyn Bridge are each 15¾ inches in diameter. This dimension, however, includes the wrapping of steel wire, so that the actual diameter of the cables is a fraction less.

## REFERRED TO OUR READERS.

### Straightening Old Doors.

*From* S. A. P., *Pawtucket, R. I.*—I desire to ask of the practical readers of *Carpentry and Building* if old doors can be straightened. Can a door the stile of which has been sprung ½ inch be utilized again, or, in other words, can the spring in the stile be taken out together with the wind? Why I ask is because such a door was brought to me a short time since to be used in a barn. I knew of no way of fixing it, and at my suggestion the owner procured a new one. I now raise the question, hoping to have information from the practical readers of the paper.

### Barn Turn-Table.

*From* E. E. S., *Hortonville, Vt.*—I am desirous of getting from some one of the many experienced carpenters who furnish so many valuable hints in the columns of *Carpentry and Building* a plan for a turn-table for use in the floor of a barn, for the purpose of turning around a two-horse wagon with hay rigging and team. I think something of this kind would be very generally appreciated. Farm barns through which a wagon can be driven are exceedingly rare, and those provided with a turn-table by which a team can be taken out at the one entrance are more and more demanded.

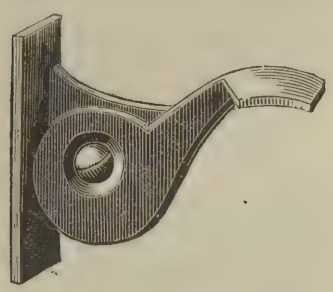
### Inside Blinds.

*From* J. D. L., *South Chicago, Ill.*—I desire to ask the practical readers of *Carpentry and Building* for the best way to figure to get the exact width of inside blinds for a six-fold blind. What will be the width of the pocket blind so that all blinds will fold into the pocket nicely without any of them striking the coring of the pocket before they enter the pocket?

# NOVELTIES.

**Brown's Window Lock and Support.**

S. A. Brown, 385 Washington street, Buffalo, N. Y., is manufacturing the window lock and support illustrated by the cut given herewith. It is a very simple contrivance, and requires but little explanation.



*Novelties.—Fig. 1.—Brown's Window Lock and Support.*

It is made, as indicated, in two parts—the lever and the plate on which the pressure for fastening the window is applied. The plate is held in position by its back piece or bracket, which passes under the lever, where it is given play of about ¼ inch, so that it can move freely under the pressure which is brought to bear on it by the lever. The lever, it will be observed, is fastened by a screw, on which it turns, to the sash, and, being in the form of an eccentric, when brought down, drives the plate against the frame of the window, and thus secures the sash.

**Folding Gimlets and Screw-Drivers.**

The illustrations given herewith represent the manner in which folding gimlets and folding screw-drivers are made by the Cincinnati Tool Co., Cincinnati, Ohio, Fig. 2 showing one of the tools closed and Fig. 3 representing another tool open. They are obviously intended for use when it is desirable that a gimlet or screw-driver be carried in the pocket. The handles are described as made of refined malleable iron, and the tool itself of steel. The screw-drivers are made in 6 and 7 inch sizes, and the gimlets of the following sizes: $\frac{5}{32}$, $\frac{4}{32}$, $\frac{5}{32}$, $\frac{6}{32}$, $\frac{7}{32}$ and $\frac{8}{32}$ inch. The manufacturers call attention to the fact that these goods are made specially heavy and strong.

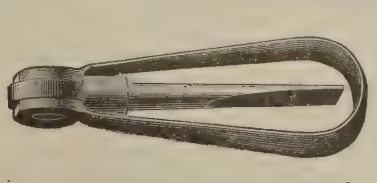


*Fig. 2.—Folding Screw-Driver Closed.*

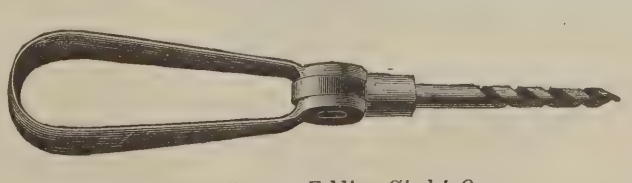


*Fig. 3.—Folding Gimlet Open.*

**Iron-Frame Door-Clamping Machine.**

Fig. 4 of the accompanying engravings represents a door-clamping machine with single-motion clamping lever recently brought out by J. A. Fay & Co., of Cincinnati, Ohio. It is claimed to be one of the most powerful clamping machines ever constructed. The frame is made with plate sides. The lever is extra heavy and strong, and in general the machine is so arranged as to withstand any strain occurring in clamping doors without liability of breakage. The top of the machine has two receiving rails which carry movable clamps. These are fitted so that they can be moved instantly to any part of the rail desired. In operation all that is necessary to be done is to force down the foot-treadle and adjust the end screw to the pressure desired. The arrangement of the lever connections is on the principle of a knuckle joint. Accordingly the greatest amount of power is applied just as the joint is closed, or where the greatest resistance occurs. Cross-rods pass through the bars, which in action rise a little above the center. These rods secure the clamp in position until the door is wedged. A supplemental treadle, touched by the foot, releases the door and allows the clamp to open. The capacity of the machine is from 4 feet 3 inches wide by 8 feet 8 inches long down to 6 inches in width.

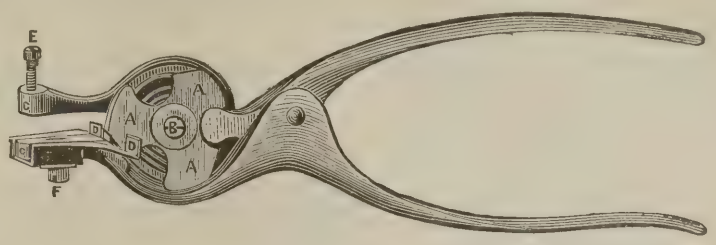



*Fig. 5.—Borthwick's Patent Rotary Saw-Set.*

**Borthwick's Patent Rotary Saw-Set.**

Fig. 5 represents a rotary saw-set which is manufactured by the Borthwick Saw Set Co., 337 Market street, Philadelphia. It will be seen that the disk A A A, which is operated by a lever, has three setting faces, which are of different width, thus making the regular size saw-set capable of setting any size tooth from a fine butcher saw to a coarse rip-saw. Changing the face of the disk, in order to suit the teeth of the saw to be set, is readily accomplished by removing the screw B and turning the disk until the right face is presented, when B is to be replaced and the set is ready for use. By means of a spiral spring, shown in the cut, back of the disk, and connected with it, the disk, having been forced down against the tooth by the action of the lever, is brought back to its original position, so as to permit the free movement of the saw. D D is a gauge against which the saw rests and which can be regulated by the screw F, and thus adjusted to the size of the teeth. The set of the saw is regulated by the screw E, which is raised for fine and screwed in for coarse set. The disk, a part upon which the greatest wear comes, is described as made of the best cast steel, properly tempered, and the anvil or setting stake, against which the face of the disk strikes when there is no saw between the two, is made of

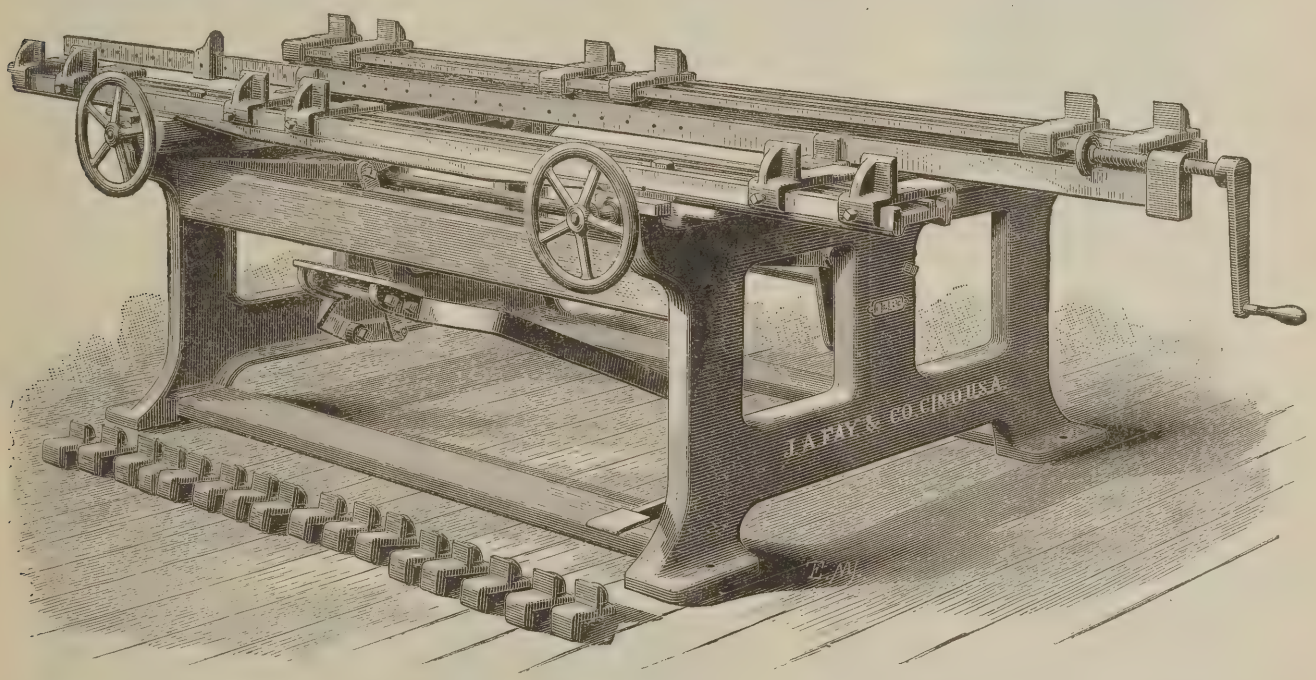



*Fig. 4.—Iron Door Clamp. J. A. Fay & Co.*

the same material. The manufacturers, besides alluding to the uniform set thus given to the teeth, lay emphasis on the freedom from danger of breaking the tooth, which results from the fact that this tool gradually rolls the tooth to a set, instead of using direct action, as employed in other saw-sets. The length of the tool No. 1, which is fully polished, is 8½ inches.

### New Expanding Conductor-Pipe.

W. F. Potts, Sons & Co., No. 1225 Market street, Philadelphia, are directing the attention of the trade to Starr's Rectangular

*Novelties.—Fig. 6.—Starr's Beaded Rectangular Expanding Conductor-Pipe.*

Expanding Water Conductor-Pipe and Carr & Smith's patent fastenings. The general appearance of the conductor-pipe will be understood by the larger of the accompanying engravings. The pipe, we are informed, is manufactured in 8-foot lengths, and, as will be seen from the engravings, has a very

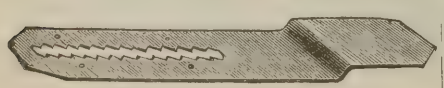


*Fig. 7.—Fastener Used with Square Beaded Conductor-Pipe.*

handsome appearance as well as being an expansion-pipe. The fact that it is made in 8-foot lengths without seams gives interest to this article over other goods that are made in short lengths joined together by soldering. One of the best conductor fasteners which it has been our opportunity to examine in a long time is that which has been prepared to go with this pipe. This is illustrated in detail in Figs. 7, 8, 9 and 10 of the engravings. Fig. 8 represents the flange or socket, which is fastened to each length of pipe. This is put in place by soldering, and is securely held in position by the shape of the flange itself and the surface

*Fig. 8.—Flange or Socket Soldered to Pipe.*

of the pipe against which it is placed. The pin shown in Fig. 9 is then driven into the wall. The fastener is slipped into the socket on the pipe, and over the star-shaped head of the pin. The slot in the fastener, shown in Fig 7, measures 4½ inches, thus covering two joints of brickwork, making it possible to accommodate any variations that may be encountered. After the fastener has been slipped over the head of the pin the ring,

*Fig. 9.—Driving Pin.* *Fig. 10.—Ring.*

shown in Fig. 10, is inserted in the eye of the pin, thus preventing the fastener from slipping out of its place. The offset in the fastener is about ½ inch, at which distance the pipe is held from the wall. In their circular describing this article the manufacturers say that tinsmiths will observe at a glance the advantage of this fastener, since its use obviates the necessity of measuring where to solder the shoulder, as is usual with many pipes. Wherever the flange may be inserted there is no difficulty in making the fastenings fit. According, all that is necessary in putting up the pipe is a hammer and a pair of shears. One set of fasteners is used to each length of pipe.

### New Double Spindle Shaping Machine.

The Rollstone Machine Co., of Fitchburg, Mass., have recently completed the machine shown in Fig. 11. It is designed for molding and shaping straight and irregular forms for carriage, wagon, car and furniture manufacturers. The frame is cast in one piece, cored out, is heavy, substantial and well proportioned. The column is fitted with a door, which makes a very handy place for tools, &c. The spindle-boxes are combined with the slides, being cast on, and the slides are planed and gibbed to the base, and are adjustable vertically by a hand-wheel in front of the machine. The steel spindles and pulleys are long and stiff, perfectly turned and balanced, and run in long bearings lined with Babbitt. The table—either iron or wood, as wanted—is large, perfectly true, and fitted with concentric rings to suit various sizes and kinds of heads and cutters. The wood table, when preferred, is made of narrow strips of hardwood glued up, so as to avoid all warping or getting out of true.

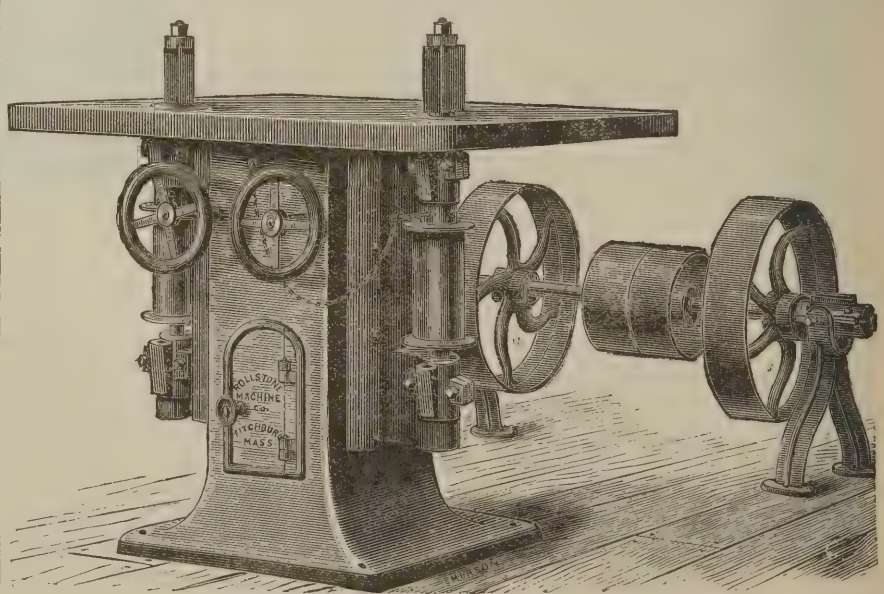



*Fig. 11.—Double Spindle Shaping Machine, Built by the Rollstone Machine Co.*

The spindles will take cutters up to 4 inches long. The pulleys on the spindles are 4 inches in diameter, with 8-inch face. The tight and loose pulleys on the counter are 10 inches in diameter, with 4½-inch face. The drivers are 20 inches in diameter, with 4½-inch face, and should make about 750 revolutions per minute.

### Payson's Universal Transom Lifter.

The Payson Mfg. Co., Chicago, Ill., are putting on the market the transom lifter which is represented in Fig. 12. It will be seen, as indicated, that the projection in the lower part of the locking device fits into notches in one side of the operating-bar, which is kept in place by a spiral spring in the cylinder of the locking device.

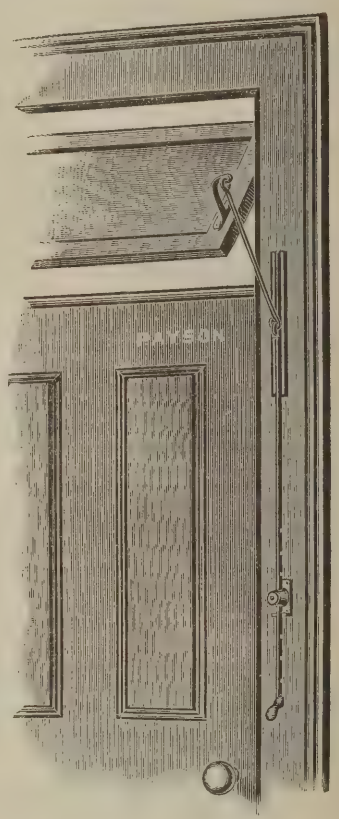
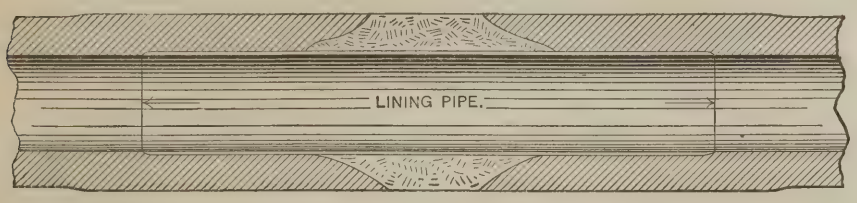



*Fig. 12.—Payson's Universal Transom Lifter.*

When it is desired to change the position the operating-rod is pulled outward, thus disengaging it from its fastening and permitting a free movement either up or down. Alluding to the advantages resulting from this construction, the manufacturers call attention to the fact that the lifter is operated with one hand; that the locking device is in plain sight; that as self-locking there is no danger of heavy transoms dropping and breaking; that it cannot be moved from any position in which it may be left from the outside; that the guide and crosshead have a wide, solid bearing for the weight of the transom, and that one style of lifter is adapted to the transoms hung at either top, bottom, center or end. It is made at present in four sizes.

### The Patent "Clear-Bore" Joint.

The Patent Joining Lead Pipe Co., South Parade, Manchester, England, are the manufacturers of means for making what are known as "clear-bore" joints in lead pipe




*Novelties.—Fig. 13.—The "Clear-Bore" Joint.—Sectional View of Joint.*

to take the place of wiped joints. It is from their catalogue that we have taken the following illustrations and description of the clear-bore joint: Fig. 13 shows a sectional view of two ends of a lead pipe connected by the clear-bore joint, the solder being indicated by the lighter shading toward the middle. The joint is made by the process known as "burning." The ends of the pipe to be joined, having been squared, are inserted into a die and a tapered mandrel or drift forced into it, by which means the end of the pipe is expanded slightly. The die and drift are then removed from the pipe and a second larger mandrel is forced in to bring the internal diameter of the pipe to the required size. This mandrel has a groove cut in it at a certain distance from the end, so as to determine the exact depth to which the enlargement of the pipe is carried. The ends to be joined having been prepared in this manner are scraped inside to a distance of about ½ inch and greased. A lining-pipe of a size suited to the joint is then inserted in the ends of the pipes. The thickness of the lining-pipe, which is made

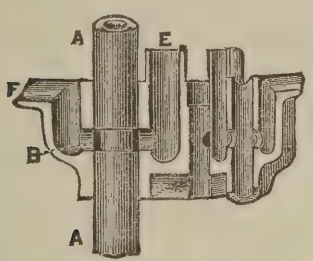



*Fig. 14.—Upright Mold for Straight Joints.*

of brass, is such that it will fit the enlarged diameter of the ends and have an internal diameter which shall coincide with that of the pipe. This having been done, the pipe is ready for the burning or soldering operation. While the preliminary preparations have been in progress, a sufficient

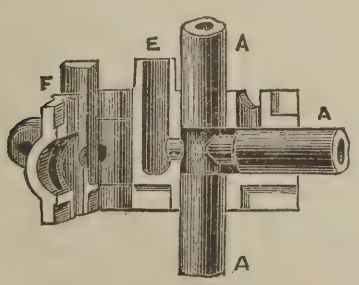



*Fig. 15.—Upright Mold for Branch Joints.*

quantity of metal to run the joint has been melted, and the mold in which the joint will be made has been warmed. In every case the mold consists of two halves hinged together, as shown in Figs. 14 and 15. The molds shown in the cuts are upright ones for straight and branch joints respectively, horizontal molds made on the same general plan being also used. Each half of the mold has semi-cylindrical grooves cut in it. These are for containing the pipes to be joined, and the inlet E, through which the metal pasess to the joint, and the outlet F, from which it escapes. The inlet and the outlet are joined to the mold by suitable gates. The pipes being placed in position exactly fill the mold, except for a short annular

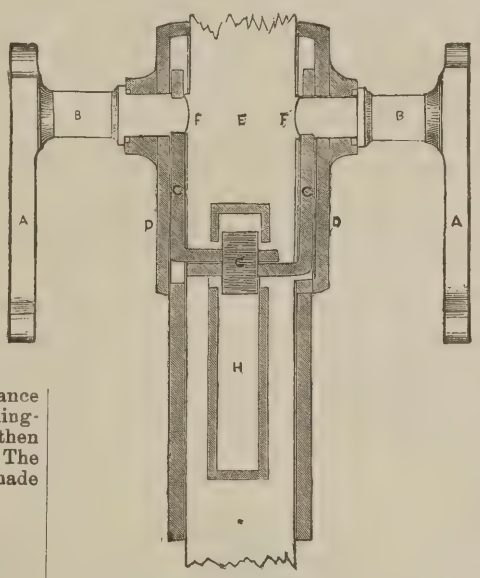



*Fig. 16.—New Lock Furniture Brought Out by the Gilbert Lock Co.—Vertical Section Through Door.*

space between them, so that when the mold is closed there is no opportunity for the molten metal to take any other course than through the inlet, the gates, the vacant part of the mold and the outlet. On pouring the metal the ends of the lead pipes are gradually melted away, so that the actual fusion, or mixture of the new metal with the old, takes place, and the joint is thus homogeneous with the pipe, and of the same dimeter internally and externally. The molds are made of different sizes to accommodate pipes of standard diameters. A little modification of the process is requisite when it is desired to connect brass fittings to lead pipes. In this case the bore of the fitting is reamed or otherwise enlarged, so that the lining tube may fit inside it to a suitable depth. A lead ferrule is then slipped over the end of the fitting, about ¾ inch from the end. This ferrule should fit tightly, and the part of the fitting upon which it is seated should be painted or covered with soil, so as to prevent the subsequent adhesion of the metal. The tail of the fitting is next cleaned, and thickly tinned with a soldering copper, and the inside of the tail is soiled if there is any risk of the melted metal passing between the lining tube and the tail. The lead pipe is prepared as already described, and, the lining tube being inserted into both the pipe and the fitting, the joint may be run as before. The joint, when cool, is removed from the mold, and the excrescences cut off.

### New Lock Furniture.

The Gilbert Lock Co., of Newark, N. J., whose locks are already very favorably known to a large circle of our readers, are introducing a new style of furniture. The locks to which this new furniture is applied are the same as the company have been manufacturing for some years past. The novelty is the means by which the latch-bolt is operated. How this is accomplished will be understood by inspection of the accom-

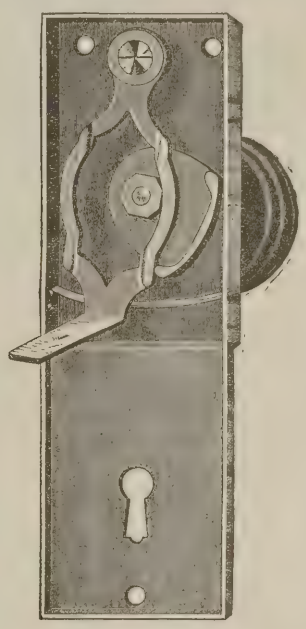


*Fig. 17.—Inside of Plate Used with the Gilbert Lock.*

panying engravings. Fig. 16 shows a vertical section through a door having a mortise lock. It will be seen that an arm enters the lock from each side of the door. Fig. 18 shows a general view of the interior of one of the locks, from which the general features of the mechanism will be understood. Fig. 17 shows an inside view of the plate used for one of these locks. This view shows the improvement applied to a rotating knob, while diagram Fig. 16 shows crank-handles instead of knobs. It will be seen that the knob or handle terminates inside of the plate, with a lever carrying an arm which projects outwardly and extends into the latch-bolt, as already mentioned. The knob operates a yoke so arranged that, turned in either direction, it swings the lever in the right way to draw the latch back. The mechanism is very simple and is

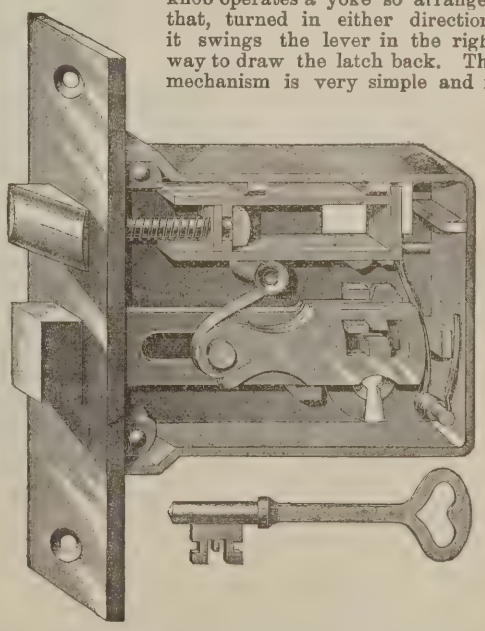
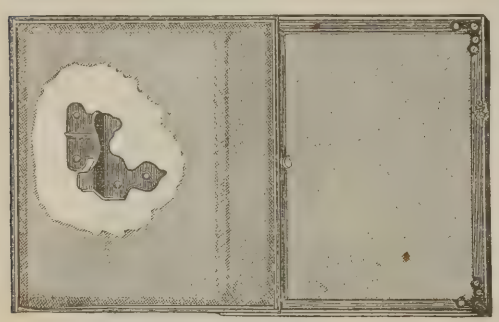


*Fig. 18.—General View of Mechanism of Gilbert Lock.*

also efficient. The locks are small, so far as the dimensions of the case are concerned. Two lengths only are made, both of which measure 3 inches in width. The narrowness of the case is an advantage, inasmuch

as it leaves solid wood for the screws used in attaching the knob and the escutcheon plate. In addition to the smallness of the case already referred to, the locks are made very thin, so that mortise locks are successfully applied to doors as thin as 1⅛ inches. The construction employed obviates the necessity of a spindle, and the overlapping of the actuating



*Novelties.—Fig. 19.—Porter's Patent Extension Window Screen.*

arms, to which we have already referred, saves the necessity of adjustment by screws, rings, washers and other means. There is no lost motion to the knob, and it has a solid bearing. The construction of the knob is such that great strength of parts is obtained, and there is no liability of its coming off or of its becoming otherwise disabled. By inspection of the lock, an interior view of which is given in Fig. 18, it will be seen that the parts are few and that the latch bolt, in addition to being straight, is placed on edge, which increases its strength and efficiency. The latches, we are informed, used in the entire series of locks, including the cheapest grades, are made of malleable iron, thus adding to the durability and strength. Some of the cheaper goods are single-acting, so far as the knob or handle is concerned—that is, they turn in one direction only. These goods are arranged both with knobs or handles, as may be desired, and are particularly employed in places where there is limited space and where, by the circumstances of the case, it is desirable to turn the handle away from the adjacent woodwork. The construction, however, is such as to allow for ample room for the fingers in any case.

### Porter's Patent Extension Window Screen.

The illustration given herewith represents a new window screen, patented March 9, 1886, which is being put on the market by E. N. Porter & Co., Burlington, Vt. As the cut represents, there is an iron lip on four of the corners which runs in a wood groove in the frame, thus reducing the friction to a minimum. It is on this lip corner that the patent has been obtained. Its form is represented in the cut, the wire netting being broken away to permit its representation. In the screen as made it will be perceived that there are eight metallic corners, four screws in each, the two ends of the two pieces of the screen which overlap having the corners with a lip, as above alluded to The strength of the screen as thus constructed, and the ease with which it is operated, are the points on which the manufacturers lay emphasis. It is made in three sizes—19 x 33, 21 x 35 and 21 x 39. Other sizes are made to order. The screens are packed in crates of one dozen or more to suit purchasers.

### New Horizontal Boring Machine.

In Fig. 20 we show a tool recently put upon the market by Frank H. Clement, of No. 131 Mill street, Rochester, N. Y., which we are informed is entirely new. It is a horizontal boring machine and possesses various features that commend it to the attention of those in need of such an article. The present tendency of machine users is in favor of better tools. It was not very long since that anything that would make a hole in a piece of wood, no matter how poorly done, would pass for a boring machine. At the present time almost every shop requires a first-class independent borer which is always ready and which can always be adjusted to any ordinary range of work. The machine here shown, which is offered to supply such wants as these, is all iron and steel with the exception of the treadle-bar. The boring arbor journals are of steel and the principal journal is nearly double the usual length. The frame is cast in one piece and the countershaft is swung in swivel boxes. The table has a vertical adjustment of 10 inches, moving on jibbed ways. It may be tilted to an angle of 45° in either direction. The foot lever arrangements give a good leverage on the boring arbor, and the springs are so arranged as to impart a quick return and an easy motion.

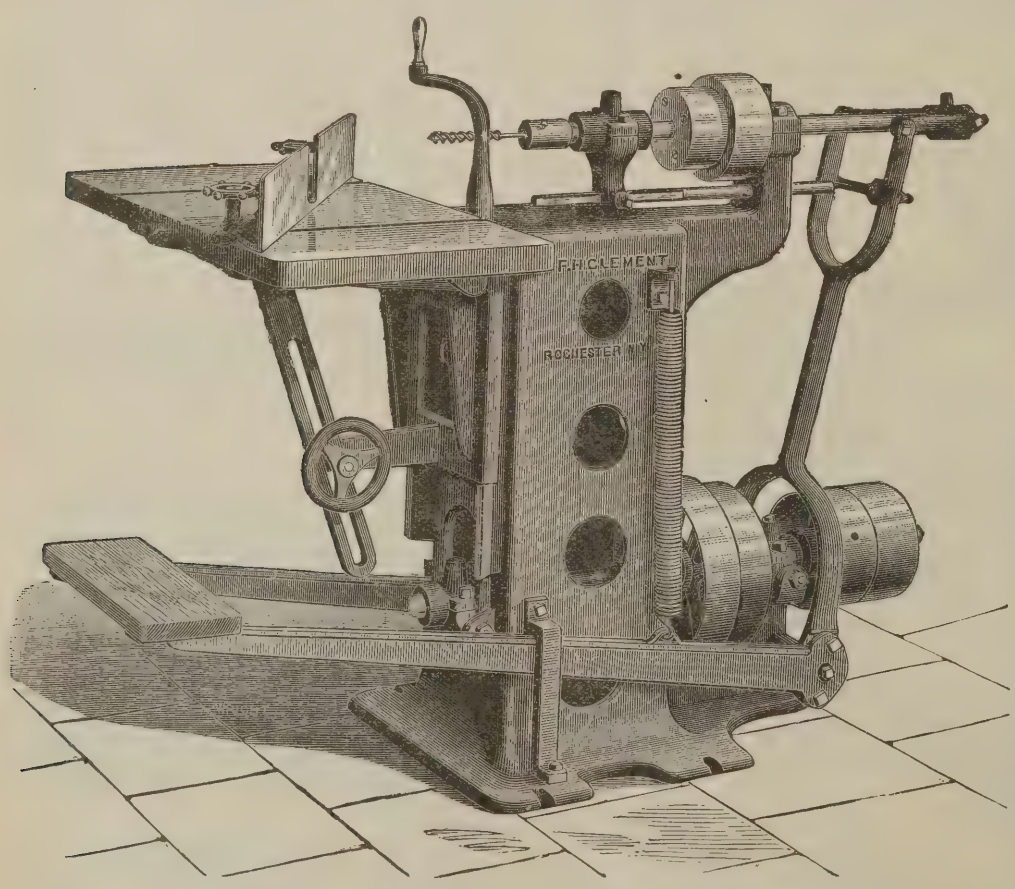



*Fig. 20.—New Horizontal Boring Machine, Made by F. H. Clement, Rochester, N. Y.*

### Improved Steam Glue Heater.

Pattern-makers, joiners and all who have occasion to use glue will be interested in the new steam glue heater shown in the annexed cut, and made by Pancoast & Maule, of 243 South Third street, Philadelphia, Pa.

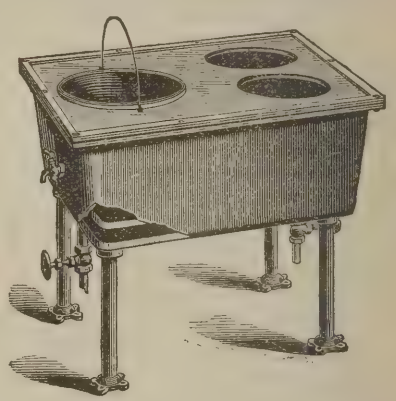


*Fig. 21.—Improved Steam Glue Heater.*

It is made of cast iron throughout, and is provided with a hollow base in which the steam circulates, by which arrangement all joints are dispensed with and leakage rendered impossible. The pots are enameled inside, which prevents any discoloration of the material being prepared from contact with the iron. All heaters are tested under 100 pounds pressure. They are made in 15 different sizes.

### The Vulcan Fire-Proof Paint.

The New York Fire-Proof Paint Co., 65 Maiden lane, New York, send us samples of shingles coated with their Vulcan paint, together with circulars describing its properties and merits. The Vulcan paint is for use on wood only, and when applied to shingles or boards is said to render them fire-proof. As evidence of the protection afforded by this paint, tests are recorded where fires built on shingle roofs coated with Vulcan paint have failed to set fire to the wood. Other instances are given of small buildings protected with this paint which have withstood the action of bonfires built within them. The same company make Soteria, a fire-proof kalsomining for interior construction where rough lumber is used and not exposed to the weather. The kalsomining is compounded without oil, and, besides affording protection against fire, is also said to protect the timber from dry-rot. They also manufacture an iron paint for use on tin roofs and iron surfaces which is said to give a finished appearance and to be firmly adhesive. These paints are made in various colors and are furnished mixed and ready for the brush, requiring only to be thoroughly stirred before being applied. In price the fire-proof paint is said to compare favorably with ordinary paints, while the kalsomining is furnished at a much less cost.

One of our exchanges devoted to decorative art, says: "We have it on the testi-

mony of a reliable man that buttermilk mixed with fine sand and applied to new woodwork outside will stand for many years, and gives the most complete imitation of stone it is possible to get, and with it absolute preservation of timber.

### House-Building.

In the estimation of many people the average contractor or builder is a rascal, determined to cheat whenever opportunity presents and willing to increase his profits upon his contracts by neglecting the things that ought to be done and doing other things in a slipshod, perfunctory manner An item that is going the rounds of the papers at the present time narrates the experience of a man who superintended the building of his own house, and who believes he succeeded in obtaining better work than would have been obtained, simply because he took pains to see that everything was done according to agreement. The story is an extreme one and somewhat improbable in some of its features, but nevertheless is worth telling. Honest builders and contractors have nothing to lose by such management as the story relates, while house owners will have no cause to regret carefully overseeing their work, no matter with whom the contract is placed. According to our exchange in which the story first appeared, there has been a continuous wail going up from unfortunate people in every community who are building, from the somewhat indefinite era of the man who builded his house upon the sand previous to the rainy season down to the present year.

It is a tale of worriment, of estimates exceeded and exasperations endless. It is reassuring, then, to find at least one man who was too much for the wicked contractor, and built his house not only upon a rock, but like a rock, so that it shall stand until some elevated railroad of the future gets the right of way through its second story. Thus saith the man who beat the contractors at their own game: "People can't be too careful when they are building, for those who don't know what is what in the way of work and material are systematically taken in by the contractors. The architect is supposed to see that the contracts are carried out, but he can't always be on hand, and when a dispute does arise he naturally leans toward the mechanics. Many of the inexplicable fires that occur in first-class dwellings are simply the result of criminal carelessness and fraud on the part of workmen and contractors. I had a running fight while my house was building, but it was done as I wanted it and according to contract. The party wall was 12 inches wide and bricks were to be bonded every five courses. I went to look at it one evening when the wall was 12 feet high and found only every twentieth course was bonded. Some workmen were going by on their way home. I hired them for an hour. We transformed a big beam into a battering ram, and when my friends, the contractors, came back in the morning they found their wall lying in the cellar bottom. From that time on every fifth course was bonded according to the specifications. Then we began on the framing. I had distinctly specified that the flues in the walls should be spanned. One afternoon I climbed on the upper floor beams and found a burned and sooty brick lying on the scaffolding. It had been taken out of the wall of my neighbor on the right to let one of my floor beams in.

"'Look here,' said I to the German who was doing the framing, 'you've run that beam plum into a furnace flue. Some cold winter night I'll wake up and find my house afire.'

"'Can't help dot,' replied this original Buddensiek.

"'Well, I can,' said I, and I got a piece of timber and began to pry the beam out.

"'Here! Vot der Teufel!' shouted the contractor, 'you stop dot!'

"'Get out of the way!' I yelled, 'or you'll go where the good Germans go, all before your time!'

"He grabbed an adze and jumped for me. I seized an axe and began counter demonstrations. Then while he sat down to think it over, I sat down on the end of my lever. Up came the floor beam out of its mortise, and went crashing down into the cellar. It had protruded 4 inches into what would have been a red-hot flue when the furnace was well working.

"Things went smoothly after that until we came to putting in the furnace. I had ordered double tin pipe and double pipe guards wherever a partition was pierced. One afternoon I came in and found two apprentices lathing up a partition about a furnace-pipe. I asked if the double pipe guards had been put in. They winked at one another and said 'yes.' After they had gone I cut a little hole with a hatchet and investigated. Not a sign of a guard, double or single, was to be found. It didn't take long for me to rip that all out. I told the head lather to get somebody other than those two apprentices to do the work, for if they ever entered my house again I'd make him throw up his contract, and if he sued me I'd fight him as long as I had a dollar left. The furnace-builder also wore an unhappy look after I had finished with him. Well, the house is finished, as you see, and it only cost $170 more than the original estimate. The excess was due to the building of a stone wall for the yard, instead of a fence, as originally intended, and the construction of coal-bins, which I had forgotten to include in the original estimate."

## NEW PUBLICATIONS.

### Seaside and Southern Homes.

The above is the title of the fourth number of architectural studies issued by Wm. T. Comstock, and which is just out. The plates contained are numbered from XXXVII to XLVIII inclusive, and are the work of some nine different architects. The price is $1.

Belts and Pulleys. By J. H. Cromwell. Size 5 x 7½ inches, 265 pages. Published by John Wiley & Sons. Price $2.

No doubt every one who has had occasion to use belting formulæ has experienced difficulty in getting exactly what was wanted, different authorities giving formulæ whose results vary greatly from one another. Which of these to choose is a matter not easily decided, and on the whole little satisfaction is to be derived from consulting a large proportion of the existing literature of the subject. Mr. Cromwell's book will accordingly be examined with some interest. It is divided into 31 sections, and, as the author is aware of existing defects, it is but reasonable to look for improvements. These the reader will find in many places. Mr. Cromwell says in the preface that his object in writing the book was "to present to the mechanical public a small, yet comprehensive, and, above all, an accurate, book on the subject. I have constantly endeavored to have due regard for simplicity, yet when I have found it necessary to sacrifice either simplicity or accuracy I have invariably chosen the former. All measurements and dimensions are given in English units, in order to avoid the confusion sometimes resulting from the use of the metric system, and I have endeavored by numerous simple examples throughout the book to fully illustrate the use of the various rules and formulæ."

Church Building. By James J. Parker. Size 5½ x 8 inches, 140 pages, bound in cloth, illustrated. Published by Cupples, Upham & Co. Price, $1.25.

We are indebted to Brentano Bros., of New York, for a copy of the work above described, and which constitutes a very desirable addition to the library of the architect who is at all concerned in ecclesiastical buildings. The work is an exposition of things to be considered, done and avoided in connection with church building. Almost everything is considered, from the site and preliminary plans to the furnishing of the church, including seating, carpeting, &c. The frontispiece is a photoprint of Emmanuel Church, Bellows Falls, Vt. Several drawings in perspective are shown of other churches in different parts of the country.

## TRADE NOTES

C. J. L. Meyer & Sons Co., of Chicago, manufacturers of fine wood mantels, doors, stair railing and office furniture, have recently removed their branch office and salesroom to Nos. 133 and 135 Wabash avenue. In addition to their own goods, a very fine display of which is constantly made, the firm carry a complete line of tile of the Trenton, Kensington, American and United States Tile Works. These tiles are adapted for mantel facing, hearths, vestibule floors and for wainscoting. The firm also display a fine line of bronze and iron fireplace fixtures, including coal-hods and fenders. Their salesroom is one of the most attractive in the city of Chicago, and is well worth a visit from house owners, architects and builders who are interested in the goods of the kind mentioned above.

The H. W. Johns Mfg. Co., of New York, have recently brought out a new article of asbestos sheeting felt, samples of which have been submitted for our inspection. This felting, it is claimed, possesses a number of desirable qualities not heretofore obtained in similar articles. Its uses are various, but that application of it in which our readers will feel the greatest interest is employing it in the place of ordinary building paper in house construction. We believe it is sold in competition with the common article in such general use. The material on experiment proves to be non-combustible and water-proof. A box made of the felting was kept filled with water for several days without manifesting any sign of leaking. The same box refused to burn when put into a coal stove where a bright fire was burning. The advantage of a felting that is practically indestructible, fire-proof and water proof, and not likely to harbor vermin or to be injured by vermin, is a desirable addition to building supplies. We understand that the company are prepared to send samples to all applicants.

The Patent Straw Lumber Co., whose office until recently was in Temple Court, New York City, have removed to 202 Broadway. Patent straw lumber is described on the card of the company as a substitute for plastering. Among the advantages which it possesses over plastering the statement is made that it neither shrinks, expands nor contracts from heat, cold or moisture. It is also claimed that it is not liable to drop off, and will last indefinitely. It can be finished painted, grained or frescoed. In short, it can be finished in the many ways that are applicable to ordinary wood. The circular closes with the statement that a fresh coat of paint at any time makes it as good as new.

Nichols, Bellamy & Co., 657 Washington street, Boston, Mass., send us a copy of their new illustrated catalogue. The pamphlet contains upward of 150 pages and is profusely illustrated from beginning to end with cuts of tools for nearly all of the mechanical trades, together with miscellaneous hardware. Almost everything is shown which the ordinary mechanic needs, and many specialties are included which it is sometimes desirable to order from large cities, since they are not ordinarily carried in stock by the dealers in the smaller towns. The book is very conveniently arranged and is furnished with an alphabetical index.

The Peerless Brick Co., of Philadelphia, have issued a very fine photo-collotype representing the fireplace in their office at No. 1003 Walnut street, Philadelphia. The design is composed of molded and ornamental brick of the company's manufacture, embellished by tile supplied by Sharpless & Watts, of Philadelphia. The design is by N. L. Beers, architect, of Chicago, and the original was built by Dr. W. H. Lewis, of

Hyde Park, Ill. The design illustrates in a marked manner the utility of molded brick for such purposes. There is an appropriateness about brick as a material for fireplace designs that should be generally appreciated by the building public.

M. EHRET, JR., & Co., of Philadelphia, are, we believe, the largest manufacturers in the United States of creosote oils for the preservation of wood. The report of the Committee of Scientists on Timber Culture and Wood Preservation advises creosoting as the best mode of preserving wood from the teredo. Should this advice be acted upon to any great extent it will bring the product of this firm into still greater demand.

THE BRADSTREET CO., in addition to their mercantile agency reports, are publishing a weekly commercial and financial newspaper bearing the name of *Bradstreet's*. The paper is of value and interest to observing business men in whatever capacity they may be engaged. It does not deal with credits or furnish ratings, but instead reports, reviews and discusses those matters, domestic and foreign, that have any bearing upon the business of this country. Reports of the crops in detail, investigations of different industries, criticisms on various investment securities, and reviews of the markets, are special features. The tariff, monetary matters, transportation, legal affairs and questions of partnership, with hundreds of other topics, are ably treated, not in the interest of political parties or geographical sections, but in the interest of the business men of the whole country.

THE NATIONAL SHEET METAL ROOFING CO. of New York have recently added a galvanizing department to their business, and are now turning out galvanized shingles, which they pronounce the very best article for roof coverings. This material has the advantage of being below copper in cost. Their standard tin shingle, after it is finished, is treated to a bath of melted spelter, adding, we are informed, about 25 pounds of coating to each square. Galvanized shingles made by this process are, we believe, furnished to the trade at prices in competition with tin shingles made from Old Method, Old Process and MF plates.

A. N. CARPENTER, natural landscape architect who asserts that he was born in Rehoboth, Bristol County, Mass., June 21, 1828, and who further informs us that his motto is "convenience, economy, variety, developed in good taste," has sent us a photograph of the arrangement of the house and grounds of Mr. G. H. Pratt, at Hastings, Neb., accompanied by a descriptive letter. Referring to his chosen profession named above, Mr. Carpenter says: "The heading will make known what my forte is, and I defy any man to take it from me in a fair fight." Mr. Carpenter also favors us with a little pamphlet relating to landscape architecture, the frontispiece of which is his portrait. Numerous references are given at the close of the work.

WE HAVE INQUIRIES occasionally for portable houses, or "knock-down" houses—that is, buildings that are got out at factories and arranged for erection by laborers of slight experience and skill. A number of establishments have been created for the production of such buildings both in New York and vicinity and in the West. Of those which are prominently before the public at the present time, and which are doing an export business, may be mentioned the American Patent Portable House Mfg. Co., with office at No 31 Wall street, New York. A circular of this establishment has recently been issued, which contains designs of buildings of some architectural merit as well as of great portability.

WE ARE INDEBTED to a correspondent in Philadelphia for some particulars concerning the very odd dwelling which has recently been built in Germantown, Pa., by Miss S. R. Watson. The exterior of the building, which is claimed in some respects to resemble an old English castle, is of Germantown sandstone. The interior of the house is said to be an arrangement of oddities beyond powers of description. The evident attempt has been made to produce something very unique in character and unlike that which any one else has. The architect was Mr. Wilson H. Eyre. Others who have been engaged on this building are as follows: Howard Buzby; carpenter and builder, John Shingle, stonework; Thomas Gassner, heater and ranges: Thomas B. Dale, plumbing and gas-fitting; William Binns, painting; J. C. Dedier, electric bells, and Heston Barrett, grading and excavating.

ROTH'S SAW FILER has been before the public for several years, and it has gained golden opinions from many of those who have employed it. A number of testimonials are appended to the illustration and description of this device, which appear in the advertising pages of this issue.

THE STAIR BUILDING and general woodworking shop of A. McAllister. Nos. 20 to 24 Newton street, Cleveland, Ohio, which was entirely destroyed by fire some time since, has been fully rebuilt. The new structure is as nearly fire-proof as a wood-working establishment of its kind can be made, and puts at the command of Mr. McAllister facilities for the execution of work much superior to those formerly employed.

A. L. BENEDICT, patentee of Benedict's rolling window screens, has recently removed his business from Asbury Park, N. J., to No. 27 Barclay street, New York, where he has improved facilities for manufacture. Several minor improvements in construction and material have recently been perfected. The material which Mr. Benedict uses for his screens is a fabric either of cotton or linen, as may be required. He is prepared to supply the articles in plain colors or figured, as may be preferred. Where desired a screen can be made of colors to match the shades used in the same window. Mr. Benedict claims that his screens are lower priced than others, and that the material he employs gives better satisfaction than wire cloth.

J. P. TOLMAN & Co., of Boston, Mass., proprietors of the Sampson Cordage Works, a specialty of which is a solid braided cotton window-sash cord, have recently issued a circular to architects relating to sash cords. They say: "We wish to draw notice to the fact that the specification, 'windows shall be hung with best hempen line, or hemp cord of approved quality,' leaves an opening for much future trouble to occupants." After referring to the general desirability of tests in order to determine quality, and referring to the pliability and softness of cotton fiber, they present the following statement of experiments recently performed: "The cords were arranged to run over steel-axle window pulleys with turned face, the same as are ordinarily used in the better class of buildings. Each lifted a 25-pound weight, raising it 18 inches 22 times per minute. We give the time required to wear out the cords, in each case the figures being an average of several tests: Linen shoe thread, hawser laid, $\frac{5}{16}$ inch in diameter, 60 hours; Italian hemp, cable laid, best quality, $\frac{9}{32}$ inches in diameter, 62 hours; Samson braided cotton, $\frac{1}{4}$ inch diameter, 261 hours. The comparison with the braided cords of other makers showed nearly as great a difference in favor of the Samson.

UNDER DATE OF APRIL 1 Bradley & Currier Co., of New York, issued a revised edition of their price list of sash, doors and blinds. The company have recently removed to the corner of Hudson and Spring streets, where they possess increased facilities for transacting their large business. Their new building has a frontage on Hudson street of 72 feet, with a depth on Spring street of 162 feet. It is eight stories in hight, and has power elevators and all other requisites for the business to be transacted.

THE WARREN EHRET ROOFING CO., of Philadelphia, are manufacturing a line of roofing and building papers for use under clapboards floors, &c., in partitions and under tin, slate and shingle roofs. These papers are made water-proof by a sizing of rosin. The use of building paper adds much to the comfort of houses. It is claimed that the saving of fuel in a single winter will pay for the paper required in sheeting of an ordinary frame house. Until comparatively recently the use of the water-proof sheeting was almost exclusively confined to the New England States. At the present time its use extends to all parts of the country. The Warren Ehret Roofing Co. supply samples of these papers to all applicants.

THOS. KELLY & BROS., 75 Jackson street, Chicago, issue under date of March 25, 1886, a catalogue and price list of Kelly's self-acting water-closets, stop and waste cocks, self-closing anti freezing hopper cocks, self-acting urinals and various other specialties which they monufacture. In the introductory card to the trade Messrs. Kelly & Bros. announce that the goods illustrated in the catalogue are of their own invention exclusively, and that they have spared neither time nor money in bringing them to a high state of perfection. They also state that the articles are fully covered by patents, and warn others against infringing or manufacturing them. The catalogue is fully illustrated throughout, and brief descriptions are given wherever necessary.

WOODEN SPOUTS and eaves-troughs are in common use in some parts of the country, almost to the exclusion of goods made of sheet metal. The expansion principle, which has been largely employed in sheet-metal goods, being secured by corrugating, is applied to wooden spouts by W. F. Moulton, of Burlington, Vt., by means of springs placed across the open longitudinal joints provided for the purpose. The same principle is also employed in making expanding metal pipes by the same manufacturer. A card with illustrations appears in another column.

THE RICHMOND STOVE CO., of Norwich, Conn., and Cleveland, Ohio, direct the attention of our readers to the patent sink which they are manufacturing and which is fitted with a hinged strainer and bolted trap. The article is illustrated in their card which appears elsewhere.

WE HAVE RECEIVED from the California Architect and Building News Publishing Co., of San Francisco, a copy of a little book which they have recently issued, containing the Mechanics' Lien law of the State of California and other matters of interest to architects, builders and mechanics in general. The book is supplemented by a catalogue of architectural works which the company carry in stock.

THE BODINE ROOFING CO., of Mansfield, Ohio, to whose goods we have referred on numerous occasions, again call the attention of our readers to their product in this issue. Their roofing has met with a large and increasing sale during the years it has been before the public, and has many desirable qualities to recommend it to use in various positions.

WE ARE INDEBTED to the International Terra-Cotta Lumber Co., whose office is in the Pullman Building, Chicago, for pamphlets Nos. 4 and 10, descriptive of terra-cotta lumber. The International Terra-Cotta Lumber Co. are the successors in business to the Gillman Porous Terra-Cotta Co. Our readers are already familiar with these goods, they having been described in detail in our issue of September, 1882. The pamphlets before us contain illustrations of the use of the material and the methods of application for different purposes, together with testimonials and press notices.

IN ANOTHER PART of this issue Merchant & Co. present some facts relating to the two special brands of roofing plate which they are at present offering to the trade under special guarantees. They present a narrative of the letting of the contract for the covering of a portion of the roof of the White House, at Washington, with extracts from the specification of the engineer in charge. They also present in detail the guarantees under which these special brands of roofing plates are being sold, and in addition lay before our readers a letter received a short time since from one of their customers concerning these goods.

# CARPENTRY AND BUILDING

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## NOTES AND COMMENTS.

THE cloud, no bigger than a man's hand, which was visible in the horizon of building prospects in the early part of the year, and the advance of which we have traced in recent issues, has proved to be a storm of no small magnitude. It has swept across the country like a tornado, and in many cases it has left devastation in its path. It has wrought disaster in many directions; it has filled the minds of builders with fear and consternation. In some sections it has raged with greater fury than in others. The first serious outbreak was in St. Louis and vicinity, extending southwesterly into Texas. More lately there has been trouble in Chicago and Milwaukee. The culmination of the difficulty perhaps was in the throwing of the bomb in Chicago. Since then the storm has abated somewhat, and, while there is still muttering thunder, and now and then a flash, the business of the country is attempting to go on as though nothing had happened. Our sympathies are always with the laboring man in his just demands, and we are therefore very sorry that socialists and anarchists have been able to make a catspaw of American mechanics. The eight-hour movement up to the present writing may be considered a failure, not necessarily because the aims and ambitions of the laboring people are wrong, but rather because of the unfortunate complication that has arisen in the agitation of and effort to enforce them. The labor question is uppermost in the minds of every one at the present time, and accordingly some general remarks respecting the outlook and the real needs of labor in the matter of organization will be appreciated by our readers.

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THE full strength of the eight-hour movement at the end of the first week after May 1, the date of its attempted inauguration, was clearly shown by statistics published. The total number of workmen committed to it in all parts of the country was estimated by *Bradstreet's* at 325,000. The demand for shorter hours was early conceded to 150,000 without a strike, and to 356,000 as the result of the strike, leaving 140,000 still striking at the time referred to or defeated. The trades in which the movement was most successful are those connected with house building, agricultural implement making, furniture making and machine building. These trades are not subject to foreign competition. In those which are subject to such competition, either in the way of exportation of the domestic product or importation of the foreign, the movement met with very little success. The whole movement may be regarded as experimental. In those branches of industry which yield sufficient profit to warrant an increase of wages, for that is what shorter time most commonly signifies, the increase has been very generally granted. In others it has not been granted, or, if granted, it will be withdrawn later. The principal part of the loss entailed by such an experiment proceeds from the stoppage of machinery. This machinery may be of the nature of general business superintendence, clerical force and organized system, as well as actual machines and tools in use. A deduction of 20 per cent. from the producing power of a large manufacturing establishment means much more to the community than a deduction of one-fifth of the laboring force.

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THE organization of labor has thus far proceeded upon a false assumption—namely, that the wage-earners are a class having rights and interests other than and different from those of other classes. In a republic, where all men are equal before the law and where the theory of government presumes that the greatest good of the greatest number will be sought in the framing and execution of all statutes, the idea of class rights and interests is mischievous. The interests of the wage-earner are the interests of all citizens. The time cannot be far distant when the need of yet another organization among the workingmen of this country will be recognized—an organization to protect intelligent and conservative men in the exercise of their civil rights against the oppression of those who follow the lead of dangerous demagogues, and are blinded by ignorance, prejudice and passion to their own welfare. The happenings of the past six months have been very instructive as emphasizing the tendency of labor to oppress labor, and the need of protection for those of independent thought and action against its cruel coercion. The order of Knights of Labor, however restrained, cannot accomplish this object. Its purpose, as defined in its fundamental law, is not that to which a majority of the thoughtful and intelligent wage earners of the country can subscribe. It demands a scheme of national and State legislation inconsistent with the best interests of the community, and especially of the wage-earner. Those who are attracted to the order by its profession of principles are not safe leaders of a movement which wise and intelligent men can follow.

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THE ideal labor organization is one based upon the broad principles of equity and the rights of citizenship. It should be at all times ready to protect labor against oppression, and equally ready to protect fair and right-minded employers against outrage or injustice. It will stand between the individual and the union which seeks to compel him to sacrifice his own interests, to leave work which is offered him on satisfactory terms or to contribute to the support of those who, without good reason, are voluntarily idle. It should be the refuge and defense of those in the ranks of labor who, while ready to maintain their rights under all circumstances, have that respect for the rights of others which the law requires and good citizenship demands. It should leave the member free to cast his ballot according to the dictates of his own judgment, and, as an organization, seek the best interests of labor by peaceable and reasonable means. It should oppose all anarchical teachings, discountenance and repudiate demagoguery, promote co-operative distribution and encourage temperance, thrift and self-improvement. It should open the mechanical trades to young men under a reasonable apprenticeship system, and ally itself as much as possible with the business interests of the country. It should not commit itself to any economic or financial dogmas, leaving these to the political parties which are sure to divide on every issue of sufficient importance to create a division of public opinion. It should oppose all class legislation, by whomsoever demanded, and even pledge itself, politically, to nothing except to secure honest representation and good government.

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ALL the trade unions and the Knights of Labor together represent but a small percentage of the wage-earning classes—probably not more than 5 per cent. Of their present membership a large proportion is held for no other reason than that an individual cannot safely maintain an independent position where the unions control, and there is no union or association in which men of independence of thought and action can enjoy the moral support which organization gives. We believe that if a hundred intelligent and thoughtful men should raise the standard of a labor organization such as we have described, promising protection to labor against oppression from any source, and defense against the blind violence of unions led by professional agitators, it would grow more rapidly than the order of the Knights of Labor has grown, and that hundreds of thousands of self-respecting men would join it as a means of protecting the industries of the country from the serious injury threatened by unions in which thoughtful and conservative men have no voice, but which demand of them absolute and unquestioning obedience, whatever the sacrifices entailed.

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THE present phase of labor organization is essentially temporary. Men of intelligence, with the instincts of good citizenship, cannot afford to share with the dangerous classes the responsibility for such happenings as those we have witnessed since the beginning of the present year. They cannot be expected to tamely submit to a tyranny more absolute and more reckless of individual rights than ever tempted nations to seek relief in revolution. In the threatened changes likely to grow out of the antagonizing of the Knights of Labor by the trade unions there will be a better chance for the success of such an organization as we have suggested than has yet been presented. The movement calls for a man who is equal to the opportunity it offers, and who has the intelligence to disregard the counsel of cranks, theorists, demagogues and politicians. It need proclaim nothing but a determination to respect and defend the rights of all men.

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THOSE who have occasion to give directions about house painting and interior decorations are frequently at a loss with reference to the harmony of different colors. Harmony of colors can only be produced by contrast. But on the other hand all con-

trast is not harmony, as many of our readers have found out to their sorrow in attempting to order decorative work. Harmony is agreeable contrast, one that is pleasant to the eye in about the same sense as a chord in music is pleasant to the ear. It would be difficult to lay down positive rules for the harmony of contrast. Success in this matter appears to depend upon what is commonly designated as "an eye for color." According to an eminent English authority, an experienced artist can bring any two colors together, but experienced artists require very few directions. For the benefit of those who do need directions the following list of agreeable contrasts has been prepared by Mr. J. G. Grace the authority above referred to: 1. Black and warm brown. 2. Violet and pale green. 3. Violet and light rose-color. 4. Deep blue and golden brown. 5. Chocolate and bright blue. 6. Deep red and gray. 7. Maroon and warm green. 8. Deep blue and pink. 9. Chocolate and pea green. 10. Maroon and deep blue. 11. Claret and buff. 12. Black and warm green.

ONE of our exchanges has been lauding the skill of Japanese mechanics and depreciating the education which American boys receive in our common schools in comparison. It is said that a Japanese mechanic can accurately measure distances with his eye. It is asserted that he reduces wood and iron to squares and levels in the same way. It is intimated that he is able to cut a board or stick to a required length, using his eye simply as the means of measuring. With reference to Japanese boys it is further asserted that one who is fairly well educated draws as well as he writes. In illustrating this the writer says that having occasion to ask a Japanese student about the methods of warfare in that country, the student having been a soldier, he figured his explanation in a neat drawing on paper. He could not command enough English words to make his meaning clear, but he could make himself understood with a pencil. In comparison with this it is asserted that not one American boy in ten who has received an ordinary common-school education is able to make a freehand drawing illustrating implements of any kind. We fear there is a basis of truth in this last assertion about the average American boy, whether or not the other end of this account be exaggerated. If the assertion had been made that he would fail on trial to write a business letter correctly we should reluctantly have admitted this was true in many cases also. We acknowledge that it is very desirable that skill in drawing should be acquired by schoolboys. Skill in the art of drawing is useful in almost every walk of life, and those who acquire the art profit thereby, but at the same time we think the comparison is an unfair one at best.

THE trouble with such comparisons as our exchange referred to above has instituted is this: In this country education up to a certain point is practically universal. We have none, comparatively speaking, who do not have the benefits of our common-school system. And education with us to a large extent is limited to the common-school system. We do not attempt to get beyond a certain line with the mass. Those who are chosen from other countries with whom to compare the product of our common-school system come from the so-called educated classes, and are seldom taken from those people who if they lived in this country would be solely dependent upon the common school, or, in other words, who in their own country have no education at all. The unfairness of the comparison is evident. If a young military engineer of this country were selected for comparison with the Japanese the odds would not be so great, perhaps, but they would be on the other side. In the case of the mechanic, the American carpenter may not be able, from lack of practice, to get along without a square and a straight-edge, but with a square he can perform what would be considered wonders when viewed from the standpoint of the Japanese. The American mechanic knows more in five minutes about labor-saving tools and how to use them than the Japanese will know or learn in a lifetime if left to his own resources.

ALL this being said, however, it remains that our country does not, or at least has not in the past, afforded the means of special education which would enable the majority of our youth to compare favorably with the specially trained youth of other countries, Japan included. But this is being changed somewhat at the present time. We have numerous manual training schools and institutes of technology, to say nothing of drawing schools and special courses, and we are fast achieving a position when our youth will receive a more practical education than has ever been possible in the past. In the older countries of the world the practice of educating certain classes of the community for certain walks in life has been carried to extremes, while all that our own country has done has been to make education universal. The glory of the common schools has been that it offered an education to every one who had the time to devote to school. While the common schools will be perpetuated, they will be supplemented more and more by special schools of the kinds we have named. As the years go on, and the country becomes older, special training is becoming more of a necessity, and after a time, whether or not our boys will have the skill to measure distances with the eye, or sketch implements of war, or in other ways to show evidence of peculiar talent and training, as a nation we shall be far better prepared for the responsibilities of life than we are at present. The shame of graduating thousands of pupils every year whose education has practically unfitted them for the position in life they are obliged to occupy will ultimately be removed. Our educational system, while becoming less theoretical and more practical, will also become thorough. Above all else it will serve to qualify our youth for certain well-defined duties, thus rendering them independent and self-supporting by reason of their training at school.

THE new library building which is about to be erected in Washington to accommodate the Congressional Library is described as attractive in appearance and appropriate in design and finish throughout. The material of the new building is granite. This material is to be employed because it affords greater varieties of tints than can be obtained from marble. The plans are in marked contrast with the latest Government building erected in Washington, namely, the new Pension Office. The folly of permitting a public building to be erected of brick alone was very clearly shown in this monstrosity of architecture. Prominent critics have no hesitation in pronouncing it one of the ugliest buildings of its kind in the entire world. The fact that such a building could have been permitted in these days of modern architecture is a puzzle that can only be explained on the ground that its design was turned over absolutely to an engineer who knew far more about everything else than he did about architecture. Much of the credit for the new building which is to be erected for the Congressional Library is due to Mr. Spofford, who has been librarian for 20 years past, and who has worked in the interest of a new building, in season and out of season, for many years past.

THE management of lightning-rods is of interest to builders in general. According to an eminent writer on this subject the following principles are to be kept in view in the application of lightning-rods. The rod should be made of the best conducting substance; it should be continuous, and have great electrical capacity, and the metal of which it is composed should expose as great an extent of surface as possible consistently with strength and durability. Its upper extremity, which should project freely into the air, should be pointed and may be triangular, somewhat similar to a bayonet. In cases where metallic vane spindles or other points exist it may commence from these. It should be led as directly as possible along the building, and be fixed to its walls. It should terminate immediately under the surface of the ground in two or more branches passing out in any convenient direction; these branches should, if circumstances permit, be connected with a spring of water, a drain or some other conducting channel. It should be applied immediately to the part to be defended, and not at a short distance from it, and should be so applied that a discharge of lightning falling on the general mass could not possibly find its way to the ground by any circuit of which the conductor did not form a part—that is to say, the conductor should be united with all the great masses of metal in its vicinity which offer other possible lines of discharge. By this arrangement no more of the discharge could pass in the direction of such masses than could be transmitted without damage. It is not difficult to carry out these views in the application of conductors to stationary elevations—these may be defended by solid or tubular rods or flat plates of metal applied in any convenient way, and carried over projecting portions of the building; when fixed, such conductors require little further attention.

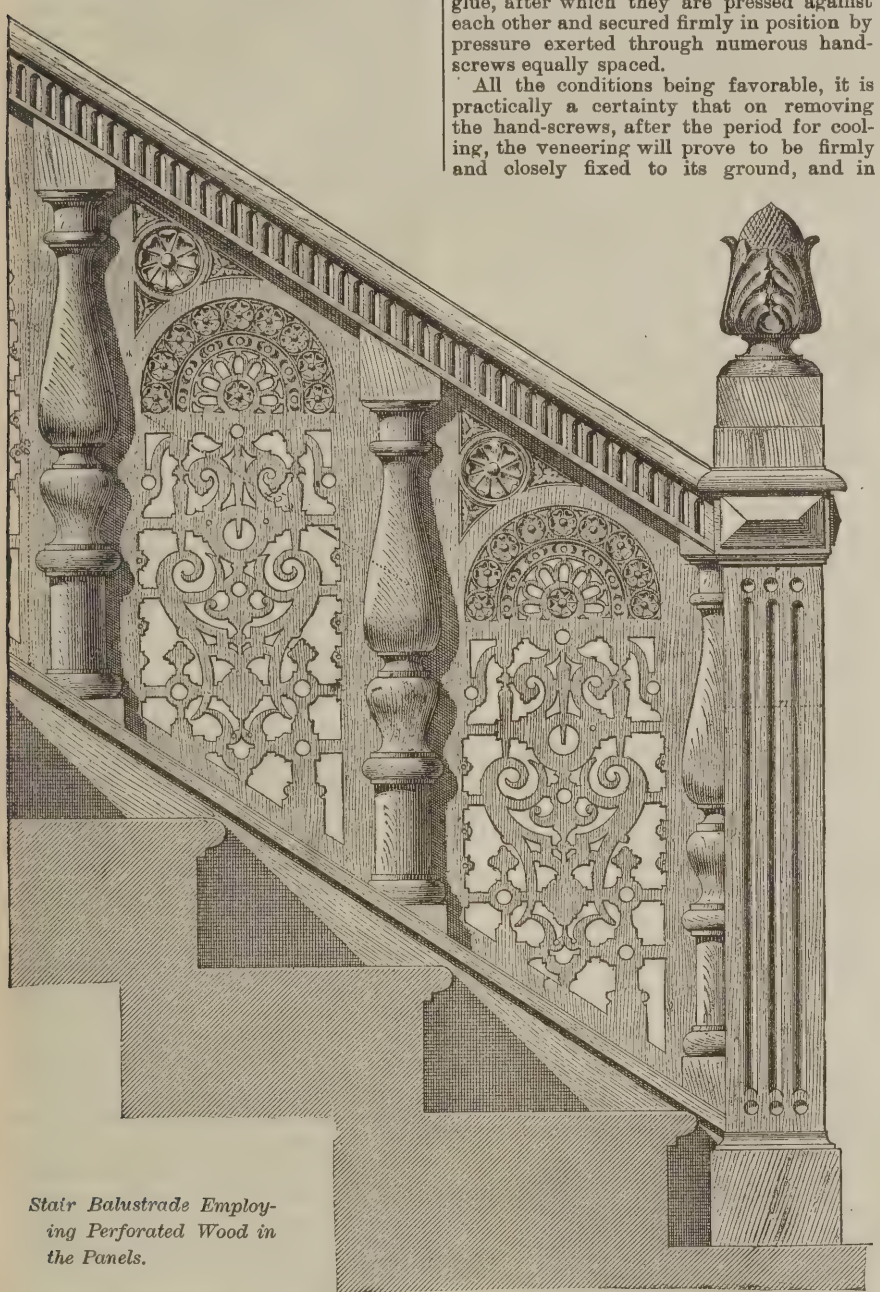
SOME of our scientific exchanges are describing a kind of concrete that is said to be in use for building purposes in France. It possesses the desirable qualities of solidity and hardness. It is said to be composed of 8 parts of sand, gravel and pebbles; 1 part of common earth, burnt and powdered; 1 part powdered cinders, and 1½ parts unslaked hydraulic lime. These materials are thoroughly beaten up together, their mixture giving a concrete which sets almost immediately, and becomes in a few days extremely hard and solid, which property may be still further increased by the addition of a small quantity—say 1 part—of cement. Among other constructions to which this material has been applied is a house three stories in hight, 65 x 45 feet, standing on a terrace, having a perpendicular retaining wall 200 feet in length and 20 feet high. Every part of this structure was made of the hard concrete, including foundations, vaults of cellars, retaining wall, and all walls, exterior and interior, as well as the cornice-work, moldings, string courses, balustrades, parapets, and the building is without band iron, lintels or wood throughout.

## THE PLATES.

Plates XXI, XXII, XXIII and XXIV, which we present this month, are devoted to the perspective view and elevations of the first prize design in the Seventeenth Competition, which are described at length in another column.

## Stair Balustrade.

The illustration on this page represents a stair balustrade of French design, in which panels of thin wood are employed, a portion of the ornamentation of which is secured by perforation. There is also a small amount of carving sunken below the surface near the tops of the panels. The illustration is of interest, inasmuch as it exemplifies contemporaneous French work. Taken in connection with another design of similar work, which appears in our correspondence department this month, and the details of the prize design, it affords a happy contrast between what is being done at home and abroad.



*Stair Balustrade Employing Perforated Wood in the Panels.*

## Veneering.

Since variations of temperature are manifest in all matter and material, and since they are directly in proportion to the degree in which the materials are subject to them, the influence of variations of temperature cause certain standing conditions to exist and make it necessary for the operator in various processes to take such measures as will counteract them. In three ways is this specially noticeable in the art of applying veneering to its ground. First, by the action of the temperature on the wood. Second, on the glue or adhesive substance used to secure the veneering, and, third, its action on the two together during the time of setting. Veneering to insure a satisfactory result must be prepared with its covered surface leveled and scratched with the comb or tooth plane. The groundwork (usually built up in narrow strips) must be got out of wind and similarly scratched in order to secure a firm keying for the glue. This accomplished, the operator places his stuff in a hot box to render it perfectly dry and to contract the fibers so that the surface may become porous enough to admit the minute keys of glue which are drawn through the scratches and thence into the pores by the action of the heat. When sufficiently warm the two faces are then covered with a carefully prepared layer of glue, after which they are pressed against each other and secured firmly in position by pressure exerted through numerous hand-screws equally spaced.

All the conditions being favorable, it is practically a certainty that on removing the hand-screws, after the period for cooling, the veneering will prove to be firmly and closely fixed to its ground, and in addition free from liability of loosening or raising. On the other hand, should the temperature be low in the shop or place where the operation is being performed, the conditions are unfavorable, and there is no assurance that the work will result satisfactorily. Several reasons for this occur. Frost may enter the pores while the wood is under treatment, which would necessitate a protracted heating in order that it may be removed and the fibers thoroughly warmed. Again, transferring the pieces to the gluing bench gives the air an opportunity to cool the exposed surfaces. Besides this, the glue being in an extremely delicate lay er is more or less affected by cold air, and accordingly after exposure is not in that elastic condition necessary to draw the woods together. Lastly, the too rapidly diminishing of the heat in the wood will prematurely stiffen the glue before it has completed its task, or, in shop parlance, before it has "set." It is therefore essential when applying veneer that the shop should be heated to at least 50° F., in order to prevent premature cooling and to keep the different substances warm enough to insure a permanent fastening.

## First-Prize Design in the Seventeenth Competition.

We present this month, for the consideration of our readers, perspective view, elevations, floor plans and details of the design submitted in the Seventeenth Competition by Messrs. Pohl & Simonson, of No. 318 Third street, Washington, D. C., to which was awarded the first prize in that contest. The draftsmanship displayed is of a high character of excellence. The planning of the building secures many conveniences, and its construction and exterior ornamentation is a sufficient variation from what may be styled the "conventional" at the present time to be pleasing to a large number of practical builders throughout the country. Eastlake, Queen Anne, Early English, Colonial and other styles which have predominated for several years past have prepared the palate of the public for a change, and these authors, while employing some features of design which were in vogue before the advent of Queen Anne, have constructed a building which is in no respect a copy of old styles, yet is a pleasing variation upon present fashions. The following is a reprint of the manuscript accompanying the drawings:

GENERAL DESCRIPTION.

Upon kind invitation of *Carpentry and Building* for the Seventeenth Competition, we have most carefully studied the subject, and, although it was permitted to submit designs of already-built houses, we have designed an entirely new building in order to create something novel and new. The plan of dwelling is very compact and convenient, the hall running from front to rear, thus giving light from both sides, and a direct passage from kitchen to front doors and vestibule. Instead of two small rooms for parlor and sitting-room we devise one large parlor with bay, well planned to set furniture to good advantage. All the plumbing is kept well together, so as to save unnecessary expense of carrying pipes along. Each room has at least two windows, each on a different wall, so as to have sun, air and light everywhere. We have economized every inch of ground covered, constructed a compact house and gave it a picturesque and attractive appearance, always considering that the house is intended for a family of moderate means.

Our drawings consist of four sheets—one with plans for basement, first and second floor, attic and roof; one sheet with front and two side elevations; one sheet with a perspective view, and one sheet showing different details of exterior and interior finish. Besides, we add a brief description of specifications for the erection of the frame dwelling, and an estimate of quantities and prices which are good for the New England States.

MEMORANDA OF SPECIFICATIONS.

*Excavation.*—The entire area occupied by the building to be excavated for a cellar 8 feet deep from floor to floor. Trenches to be carried down below this level 12 inches deep for footings; also excavate for piers to support porch and veranda to a depth of 4 feet below grade line, and for hatchway to the depth of cellar foundation walls.

*Footings.*—Use good and large stones 12 inches thick and 2 feet wide for footings for foundation walls, also for brick piers and posts in cellar, these to be 12 inches thick and from 20 to 24 inches square.

*Stonework.*—The cellar windows to have brown-stone or slate caps and sills to be neatly dressed two courses of brick high and 8 inches thick, and to project 4 inches each side of window opening. Hatchway steps to be of bluestone 4 inches thick.

*Brickwork.*—All the walls from footings up to first-story beams; the hatchway walls, chimneys and various piers for veranda and porch to be built of best hard burnt bricks. Walls, piers and chimneys exposed to view to be built of selected uniformly colored

bricks; all to be laid in thorough bond in best mortar. Upon the completion of building, the walls and chimneys and piers are to be washed and cleaned with aqua fortis.

*Lathing and Plastering.*—Lath laundry in cellar, all halls and rooms and closets of first and second story and attic with good spruce laths. Plaster with three coats white finish all lathed walls and ceilings. Furnish and put up three center-pieces in first story.

*Fireplaces.*—Build fireplaces as per plans, turn trimmer arches for hearths and furnish and lay four slate hearths.

*Concrete.*—The entire cellar to have concrete floor. Use best Rosendale cement 1 inch thick upon a 4-inch foundation of gravel and broken stone.

*Chimney Caps.*—Furnish and set one brown-stone or slate chimney cap and one terra-cotta chimney piece, all as per plan.

CARPENTER'S SPECIFICATIONS.

*Timbering.*—Girders in basement to support partitions to be 4 x 12 inches. First and second story joists, 2 x 10 inches. Attic floor joists, 2 x 8 inches. Attic ceiling joists, 2 x 6 inches. All to be 16 inches on centers and cross-bridged. Cross-bridging, 2 x 1¼ inches. Sills, 3 x 6 inches. Plates, 3 x 4 inches. Veranda and porch joists, 2 x 8 inches. Rafters, 2 x 6 inches, to be 20 inches on centers. Hips, 2 x 10 inches. Studs, 2 x 4 inches. Corner studs, 4 x 4 inches. Double all joists that carry partitions. All timbers to be of spruce, except for veranda and porch, the latter to be of pine.

*Water-Table.*—To be built of good white pine, as per detail.

*Window Frames.*—Of dry white pine. All for hanging sash with weights and pulleys, except in cellar, these to be hung on hinges.

*Door Jamb.*—To be of white pine 1⅛ inches thick, rebated.

*Sash and Blinds.*—Sash to be first quality, of dry white pine, all as per detail, 1¾ inches thick. All except cellar sash to have outside blinds painted three coats in color as directed.

*Doors.*—Front doors 1¾ inches thick, raised, molded and paneled, to be of ash. All inside doors to be first quality pine doors molded and paneled, and 1⅜ inches thick. Cellar door plain, 1¾ inches thick. Rear hall door to be a sash door 1¾ inches thick. Build hatchway as per drawings.

*Cornices and Gutters.*—To be built from details, of good white pine.

*Tinning.*—All gutters and roofs of porch and veranda, also all flashing for hips and valleys, to be of best brand of MF roofing tin.

*Roofs.*—To be of spruce or hemlock boards covered with tar paper and then slated.

*Conductors.*—Four conductors of best 4-inch iron pipe to run from gutter to ground, and to connect with drain through traps.

*Clapboards and Sheathing-Boards.*—Use best pine clapboards nailed upon spruce or hemlock boards, covered with good building paper.

*Flooring.*—Floors of first and second story and attic to be good, narrow Georgia pine, flooring well laid and all uneven joints smoothed off.

*Panel-work and Gables, &c.*—All gables, dormers, veranda, porch and balconies, also the panel-work, sawed and turned work, to be executed from details, all to be of white clear pine.

*Inside Finish.*—Windows to be finished on sills and aprons. Doors and windows to have molded architraves 6 inches wide, with suitable corner blocks and bases. Attic window and door trim plain, 6 inches wide. Base-boards of first story 10 inches high, molded; base of second story and attic, 8 inches high, molded. Fit up bathroom in ash. Bathroom, kitchen and laundry wainscoted 3 feet high, with proper cap and base. Parlor finish of cypress. Hall and dining-room of ash. All the rest plain pine finish. Fit up china closet and pantry with shelves, &c. For all inside finish details will be furnished. Furnish and set four mantels of marbleized slate, cost $20 each set complete.

*Stairs.*—Build main stair as per drawings. Risers, ⅞ inch. Treads, 1⅛ inches; springers, 1⅜ inches thick. Newel post 6 inches square and partly turned. Panels and moldings and turned balusters of best ash, all as per detail. Build attic and cellar stairs of good white pine.

*Plumbing and Gas-Fitting.*—Furnish one galvanized planished copper tub, two hopper closets, one basin with marble-top and back and sides, one boiler (30 gallons capacity) two Mott sinks, and place all in position; the bathtub, the basins and sinks to be supplied with hot and cold water. Traps for basin, tub and sinks. Supply all principal rooms of first and second story with one center and one side light, all other with one side light only; also place a burner in cellar near furnace and one in laundry. Make connection with gas and water mains according to the rules of the corporations. Lay a drain of tile pipe to convey all water from roofs and waste from plumbing, said drain to connect with sewer.

*Hardware.*—All doors to have hemicite knobs, good locks with steel keys. Front doors to have brass knobs and butts, also a night latch. Rear hall door and hatchway door to have bolts, besides locks. Sashes to have sash lifts and fasteners of approved pattern; use good iron weights and steel pulleys. Blinds to be hung on good hinges and patent fasteners. Attic windows, triple windows and twin windows to have automatic blinds.

*Heater.*—Provide a hot-air furnace and all necessary pipes and registers to heat all the rooms and halls and bathroom.

*Painting.*—Paint all exterior and interior pine woodwork with three coats of paint, in color as directed. All hardwood work to be filled, rubbed and oiled.

*Finally.*—It is to be understood that the building is to be completed and left broom-clean, ready to move into it, and everything necessary to be done according to plans and specifications must be executed in a skilled and best workmanlike manner to the acceptance and satisfaction of the architect.

MASON'S ESTIMATE.

| | |
|---|---|
| Excavation.—155 cubic yards excavating at 25 cents | $38.75 |
| Stone Footings.—20 perch stone, all laid at $3.50 | 70.00 |
| Stonework.—Bluestone steps for hatchway | 10.50 |
| 7 window sills and 7 caps, each $1 | 14.00 |
| Brickwork.—22,000 bricks, all laid at $14.75 per 1000 | 434.50 |
| Lath and Plastering.—1040 yards, at 30 cents | 312.00 |
| Hearths.—4 slate hearths, 5′ x 1′, 4″ x 1″ = 26′ 6″, per foot 30 cents | 7.95 |
| Concrete.—98 yards, 75 cents per yard | 73.50 |
| Chimney Caps.—Allow for both | 10.00 |
| Total | $971.20 |

CARPENTER'S ESTIMATE.

| | |
|---|---|
| Timbering.—9050 feet spruce timber, at $25 per 1000 feet | $225.00 |
| Water Table.—148 feet, at 10 cents per lineal foot | 14.80 |
| Windows.—48 windows (including frames, sashes and blinds), at $8 each | 384.00 |
| 7 cellar windows, at $4 each | 28.00 |
| Weatherboarding.—3660 square feet of sheathing, papering and clapboarding, at $48.50 per 1000 feet | 141.50 |
| Roofing boards.—1738 square feet, at 3 cents per foot | 52.14 |
| Slating.—1738 square feet, at 7 cents per foot | 121.66 |
| Cornices.—180 feet, at 40 cents per foot | 72.00 |
| Doors.—30 doors, all put up, with trimmings and hardware, at $8 each | 240.00 |
| Flooring.—3725 square feet, at 5 cents per foot | 186.25 |
| Wainscot.—105 lineal feet, at 30 cents per foot | 31.50 |
| Bathroom fittings | 20.00 |
| Stairs.—Main, attic and cellar stairs | 85.00 |
| China closet.—Pantry and other closet fittings | 20.00 |
| Mantels.—4 marbleized slate mantels, $20 each | 80.00 |
| Bases.—670 feet, at 6 cents per foot | 40.20 |
| Wood tubs in laundry | 8.00 |
| Cellar hatchway | 15,00 |
| Ornamental work.—Panels and sawed and turned millwork | 100.00 |
| Additional plain clapboarding. | |
| Veranda and porch.—41 lineal feet, at $6 per foot | 246.00 |
| Tinning and flashing | 50.00 |
| Plumbing and gas-fitting | 150.00 |
| Drains.—About 150 feet of glazed tile pipe, at 25 cents per foot | 37.50 |
| Furnace.—Heater, registers and pipes | 175.00 |
| Painting and finishing | 145.00 |
| Total | $2,668.55 |

RECAPITULATION.

| | |
|---|---|
| Total mason-work estimate | $971.20 |
| Total carpenter-work estimate | 2,668.55 |
| Estimated cost of building | $3,639.75 |

## Wood Finishing.

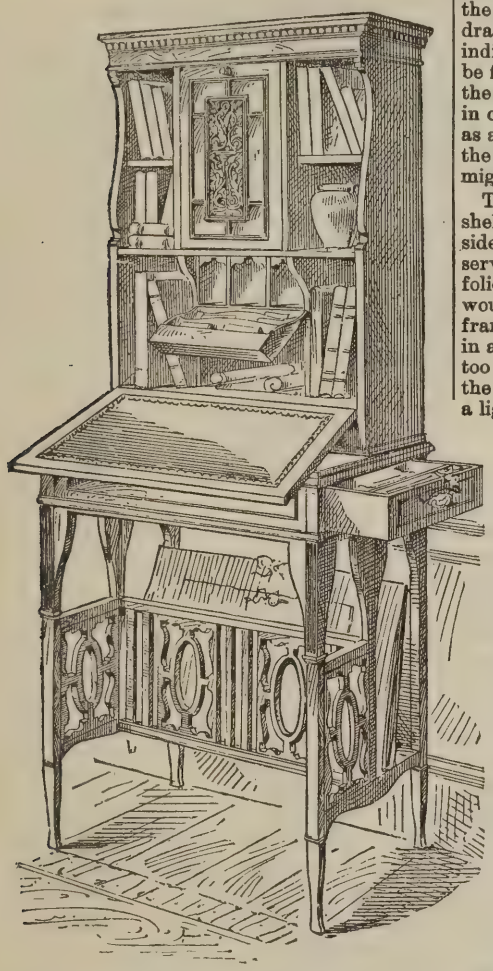
The following notes on wood finishing, from an exchange, contains matter of interest to our readers in general:

Wood finishing is the process of applying to the surface after it has been prepared, by filling and smoothing or otherwise, a thin coating of varnish or other substance to render it durable, enhance its beauty or change its appearance. There are numerous methods of finishing, and a variety of materials are used, the varieties of varnish being the principal. In their natural state all woods are more or less porous, consisting of bundles of hard fibers, with interstices filled with a softer substance. These constitute the grain, and, as the hard or soft parts predominate, the wood is said to be hard, fine or close-grained, or soft and open-grained. To fill these softer parts or pores, and give to the whole an even, uniform surface, hard and capable of a brilliant polish, is the object of the finisher's art. This hard, firm surface was formerly gained by the successive application of several coats of varnish, at least three preliminary coats being required to fill the pores; the inequalities were then reduced by fine sand or glass paper, and several additional coats laid on, the last, after becoming thoroughly hard, being polished, if desired. In this operation, however, a great quantity of varnish is absorbed by the open pores of the wood, and it is consequently so expensive that it is now seldom used. Recourse is therefore had to various plans to render the wood non-absorbent before applying varnishes, and certain compounds called "fillers" are largely used for this purpose.

Richness of effect may be gained in decorative woodwork by using woods of different tone, such as amaranth and amboya, or inlaying and veneering. The Hungarian ash and French walnut afford excellent veneers, especially the burls or gnarls. A few useful notes on the subject are given by a recent American authority. In varnishing, the varnishes used can be toned down to match the wood, or be made to darken it, by the addition of coloring matters. The patented preparations known as "wood-fillers" are prepared in different colors for the purpose of preparing the surface of wood previous to the varnising. They fill up the pores of the wood, rendering the surface hard and smooth. For polishing mahogany, walnut, &c., the following is recommended: Dissolve beeswax by heat in spirits of turpentine until the mixture becomes vicid; then apply by a clean cloth, and rub thoroughly with a flannel or cloth. A common mode of polishing mahogany is by rubbing it first with linseed oil and then by a cloth dipped in very fine brick-dust; a good gloss may also be produced by rubbing with linseed oil, and then holding trimmings or shavings of the same material against the work in the lathe. Glass-paper, followed by rubbing, also gives a good luster. Logwood, lime, brown soft-soap, dyed oil, sulphate of iron, nitrate of silver exposed to the sun's rays, carbonate of soda, bichromate and permanganate of potash and other alkaline preparations are used for darkening the wood; the last three are specially recommended. The solution is applied by dissolving 1 ounce of the alkali in 2 gills of boiling water, diluted to the required tone. The surface is saturated with a sponge or flannel, and immediately dried with soft rags. The carbonate is used for dark woods. Oil tinged with rose madder may be applied to hardwood like birch, and a red oil is prepared from soaked alkanet root in linseed oil. To give mahogany the appearance of age, limewater used before oiling is a good plan. In staining wood the best and most transparent effect is obtained by repeated light coats of the same. For oak stain a strong solution of oxalic acid is employed; for mahogany, dilute nitrous acid. A primary coat or a coat of wood fillers is advantageous. For mahogany stains the following are given: Two ounces of dragon's blood dissolved in 1 quart of rectified spirits of wine, well shaken, or raw sienna in beer, with burnt sienna to give the required tone; for darker stains, boil ½ pound of madder and 2 ounces of logwood chips in 1 gallon of water. A solution of permanganate of potash forms a rapid and excellent brown stain.

## Combined Secretary and Toilet Cabinet.

In this day of folding bedsteads, washstands disguised as desks, and other features of furniture calculated to afford the greatest utility in the smallest space, and in a measure to disguise their identity when not in use, combination furniture also comes up for attention. The article which we present herewith for the consideration of our readers is one which in its features is adapted for construction by mechanics who have comparatively little experience in cabinet-work. Its parts are simple, and the shapes are such as can be obtained by means within convenient reach of all. The article may be described as a combined secretary and toilet cabinet. Our first view shows it in use as a secretary or desk. Our second view reveals the toilet part of the apparatus, while the figures following show details of construction. The novelty of this device, the features of which are described by one of our foreign exchanges, will scarcely be disputed. The combination of a secretary and toilet table effects an economy of material and space which should make it prove a saleable article in case any of our readers undertake its manufacture. There is scarcely an inch of space wasted. In many secretaries the tops are decorated with frieze and other ornaments, but have no recommendation of general utility in the way of drawers. Cupboards are simply cupboards, and nothing more, while the space left for *bric-à-brac* is soon found to be unsuitable for any such purpose. These objections are overcome in the present article. It combines a writing cabinet with a dressing table in such a way that either may be used without inconvenience of any description.



*Combined Secretary and Toilet Cabinet.—Fig. 1.—Open as a Secretary.*

The top, which divides the cabinet in hight into two pretty equal parts, is supported on four square pillars, which are thurmed off at the foot in a simple yet effective manner. The subdivision of the space below the top, inclosed by the legs, allows for the introduction of a narrow shelf, half the width of the cabinet, and affords ample accommodation for portfolios. This diversion from the usual order of construction observed in most cabinets gives a very effective end view to the job, beside opening up a condition of usefulness which is but too seldom seen nowadays. The deep frieze supporting the top is constructed to carry a couple of drawers, working one from each end. As indicated in the sketch, one of these might be fitted up with divisions and racks to hold the necessary pens and ink-bottles, for use in connection with the cabinet when required as a secretary, the other being left clear for the reception of such MSS and documents as might be wanted.

The deep fret rising in front of the small shelf before alluded to, besides adding considerably to the beauty of the whole, would serve as a sort of screen to inclose the portfolios, which might be placed behind. It would, in addition, tend to strengthen the framing of this lower portion of the cabinet in a large degree, provided it were not made too delicate in detail. If the indication of the design shown in the sketch be followed, a light and pleasing effect, not inconsistent with the necessary strength, will be gained. The upper portion of the cabinet is broken up, so to speak, into shelves and cupboards, and no fault can very well be found with the disposition of the little space available. The large paneled frame in the lower part is made to fall down in front, in the manner customary in such cases, and forms the writing slope for use in connection with the secretary proper. It should be lined on the inside with leather in the usual way. The bottom edge of this fall is lifted 3 or 4 inches from the surface of the top, for the purpose of affording a sufficient slope, and the space thus released is filled up by three handy drawers, which might be utilized for general purposes.

The other cupboard, immediately above the writing slope, is inclosed by a door which is also made to fall down in front. It is tastefully paneled on the outside, with a little carving inserted in the center, and is so constructed that the inner side forms a mirror which can be used for toilet purposes when let down. Any angle of inclination can be imparted to this mirror by pulling out the middle drawer below the writing slope, as the door, when opened down, will rest on this. It is necessary, therefore, that this drawer be made a tight fit, and, as the pressure of the door upon it will be extremely light, it is not likely that it will prove too much for the drawer to support. The inside of the cupboard is fitted with a shelf for the reception of a hat box, and accommodation for brushes is afforded below. The cupboards at either side of the middle one are divided by means of a shelf, this allowing ample space for books or any specimens of art pottery that it may be desirable to place thereon. The cupboard, which is disclosed by the falling down of the writing slope, is divided into compartments for the usual books and papers indispensable in connection with a secretary, a few pigeon-holes being provided as usual. The space below these latter is inclosed by a stationary case which is hinged on the top to the lower edge of the pigeon-holes; therefore, when access is wanted to the bottom space, this case must be lifted forward upon the hinges, when the space is at once opened out in a satisfactory manner.

*Fig. 2.—Open as a Toilet Cabinet.*

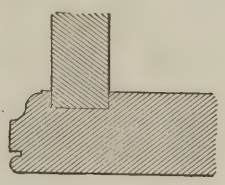


*Fig. 3.—Construction of the Fret Panels.*

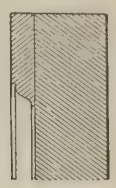


*Fig. 4.—Top Rail.*

Beginning with the construction of the lower half of the cabinet, the legs should be allowed to run the whole length from the floor to the top. The bearers and top rails carrying the drawers should be arranged in the customary manner, the only particular point noticeable being that the back rail should be kept ½ inch or so narrower than the front one. This is to allow the introduction of a thin bottom, sliding in on grooved runners, some boxing in being necessary to insure the cleanliness and safe-keeping of the papers which are likely to be placed in the drawers. This method of running the bottom is preferable to having a shelf fixed in between the legs, upon which the drawers would work, inasmuch as it makes the job less top-heavy, and is also much more expeditiously done.

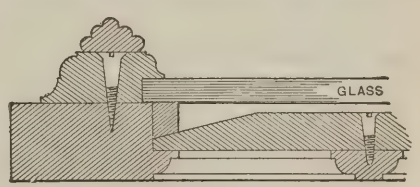



*Fig. 5.—Detail of Mirror.*

As there are so many rails and spandrils in in the lower framing it will be necessary to construct the ends first, framing them together and gluing them before proceeding to finally put the job together as a whole. The fret panels should be cut from ¼-inch material to finish ⅛ inch thick. They should be grooved into the rails which carry them, top and bottom, and also into the legs and middle supports of the end frames (see Fig. 3). This grooving might be done by introducing a loose tongue, as it is called, into the panels out of ordinary ⅜-inch stuff, as this does not weaken the rails so much as would a deep groove the full thickness of the panel. But we should not advise this plan as being the best possible. It compels the fitting in of the frets exactly to the spaces allotted to them, and if this were not effected to a perfect degree the point would be sure to show and perhaps cause some trouble later on. If the grooves are cut the whole thickness of the panels, and to a depth of $\frac{3}{16}$ inch, the frets will have quite sufficient grip of the rails, and a groove ⅛ inch by $\frac{3}{16}$ inch will not seriously weaken the rails which are to carry these panels.

*Fig. 6.—Detail of Writing Slope.*

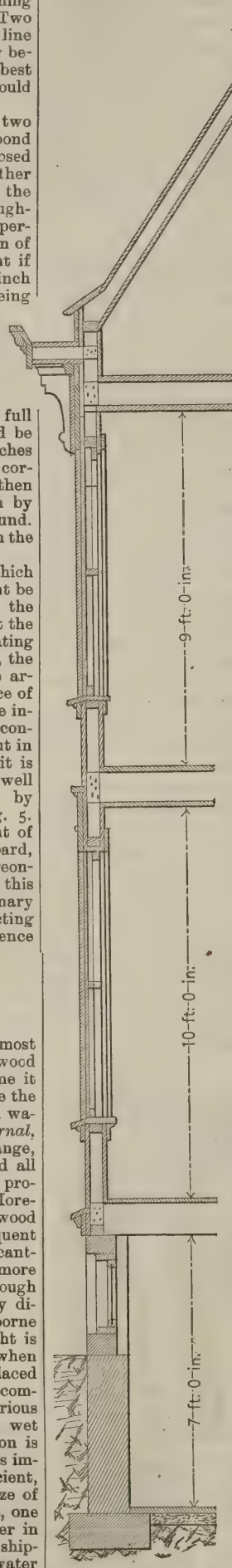
As the shelf and the space above it immediately behind the long fret panel are to be devoted to the reception of portfolios, it will be necessary to have some kind of framing at the back to give support to these. Two narrow molded rails, one placed on a line with the top fret rail, the other midway between it and the shelf, would be the best way out of the difficulty, as a panel would be rather out of place here.

The top rail, behind which run the two drawers, should be built up to correspond with the drawer fronts, so that when closed these will be in keeping with one another (see Fig. 4). The top need not be made the full width of the bottom carcase throughout, as a considerable portion will be permanently covered in by the upper portion of the cabinet. It will be quite sufficient if the top be just wide enough to run 1 inch under the upper portion, the ends being jointed out with stuff about 4 inches long to the full width required. Taking the upper carcase next, the ends should be dovetailed into the bottom from the back edge, running up from there right to the top of the cornice, thus requiring to be cut out the full hight of the job. A thin shelf should be dovetail grooved into them a few inches from the top to form the bottom of the cornice, and a piece of ½-inch pine would then do to cover in, the whole being hidden by the cornice molding, which is planted round. The small neck molding below is fixed in the same way.

The framing of the upper door, which forms a mirror when opened out, might be effected by constructing the door in the ordinary fashion, ignoring altogether, at the outset, the inner framing. Then by rebating in a pretty stout panel from the back, the effect indicated in the sketch could be arranged by planting moldings on the face of it, screwing them in position from the inside. This is not as good a method of construction as framing the door throughout in the orthodox manner would be. But it is very much quicker, and will stand very well indeed. The mirror might be fixed by means of a molding, indicated by Fig. 5. The stationery case, suspended in front of the middle space in the lower cupboard, should be fixed to the bottom of the pigeonholes by a cutting of a piano hinge, as this will make a neater job than the ordinary brass butts. The method of constructing the writing slope will be seen by reference to Fig. 6, which gives a section of it.

## Seasoning of Timber.

Though air-drying is the best and most certain way of promoting durability in wood without impairing its strength, the time it takes is often a great drawback; hence the immersion of the newly-felled timber in water is resorted to, says the *Contract Journal*, in order to arrest any tendency to change, by washing out of the pores of the wood all sap and other substances which tend to promote fermentation, and hence decay. Moreover, the soaking in water makes the wood less liable to twist and warp in subsequent drying, and when it is cut up into scantlings for use, besides rendering it more proof against the attacks of worms, though its strength is supposed to be slightly diminished thereby, which seems to be borne out by the fact that the loss of weight is greater in water-seasoned wood than when it has been merely air-seasoned. If placed in water it is better that it should be completely submerged, as nothing is so injurious to timber as being exposed to alternate wet and dry. The generally-received opinion is that for ordinary purposes a fortnight's immersion in running water is sufficient, though much must depend on the size of the balks so treated. M. de Lapparent, one of the Government inspectors of timber in France, recommends for timber used in shipbuilding one year's immersion in river water two years in fresh, or three in brakish water, constantly being changed, to be followed by two years of air-seasoning. The gradual processes of air and water seasoning are the only ones which can be safely applied to timber in large scantlings; still, artificial drying may often be successfully employed in the case of smaller scantlings, more especially in the preparation of timber for joinery, for which purpose it should be quite dry and free from any tendency to shrink. Among such systems we may mention drying in ovens or hot chambers, exposed to currents of air ranging from 90° for hard woods and large sections to 200° for soft woods in thin boards, the process being carried on until the wood has lost from one-fifth to one-third of its original weight, according to the purpose for which it is required to be used. Boiling and steaming wood for three or four hours are often resorted to, as the subsequent drying is thereby rendered very rapid, and the tendency to shrink and twist is reduced to a minimum, while the wood becomes so pliable that ribs and planks can be bent to any required curve, and, if confined until dry, will readily retain the form so given them. Smoke-drying may also be employed at times with advantage; but carbonizing or charring the outer surfaces of the wood, though very effectual in preserving it from the destructive influence of alternate wet and dry, such as the ends of posts let into the ground are so much exposed to, must never be regarded as a substitute for seasoning; for, though keeping out external moisture, it effectually imprisons that which is in the pores of the wood, and so hastens internal decay. While on this subject it may be as well to observe that paint, tar and all similar water-proof coatings are only preservatives so long as the timber is already seasoned and free from moisture, as then they keep it dry; but, if not, they become the most certain agents of destruction. For imperfectly seasoned timber the best preservative against the weather is a rough-sawn face, which forms a shield against both sun and rain, and at the same time offers no check to the evaporation of the moisture from the pores of the wood.

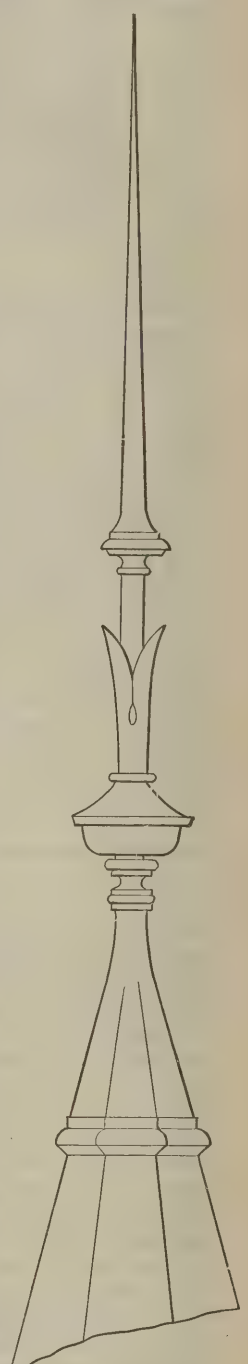



*First Prize Design.—Vertical Section.—¼ Inch Scale.*

## Seventeenth Competition.

The contest in the Seventeenth Competition, which closed May 5, was spirited. A very large number of designs were submitted, and the Committee of Award had many excellent studies to consider before their decision could be rendered. Of the studies sent in more than one-half were of sufficient merit in the estimation of the committee to make them suitable subjects for publication in *Carpentry and Building*. Of this number in turn fully one-half were so excellent as to require special examination to decide between the claims of different contestants. Almost every section of the country was represented, one set of drawings coming so far as from the island of Trinidad, in the West Indies.

The decision of the Committee of Award places the prizes as follows: First prize to Pohl & Simonson, No. 318 Third street, N. W., Washington, D. C. The design submitted by this firm was our No. 45, and bore the *nom de plume* of "To the Deserving Brave." The drawings are presented in another part of this issue. Second prize to Howard P. Miller, No. 717 Walnut street, Philadelphia, Pa. The design in this case bore our No. 70, and was submitted under the *nom de plume* of "Fernwood." It will be published in a future number of this journal. Third prize to W. P. Banks, No. 338 Main street, Bridgeport, Conn. The design in this case was our No. 22, and was submitted under the *nom de plume* of "Ko Ko." This set of drawings is already before our readers, having been published in March.



*Galvanized-Iron Finial, Top of Tower.—½ Inch Scale.*

The committee recommend the following designs for honorable mention:

No. 58, "Cui Bono," D. B. Provoost, Elizabeth, N. J.

No. 38, "South," Carl Trotsche, San Diego, Cal.

No. 78, "X. Y. Z.," H. E. Peipers, No. 520 Pine street, St. Louis, Mo.

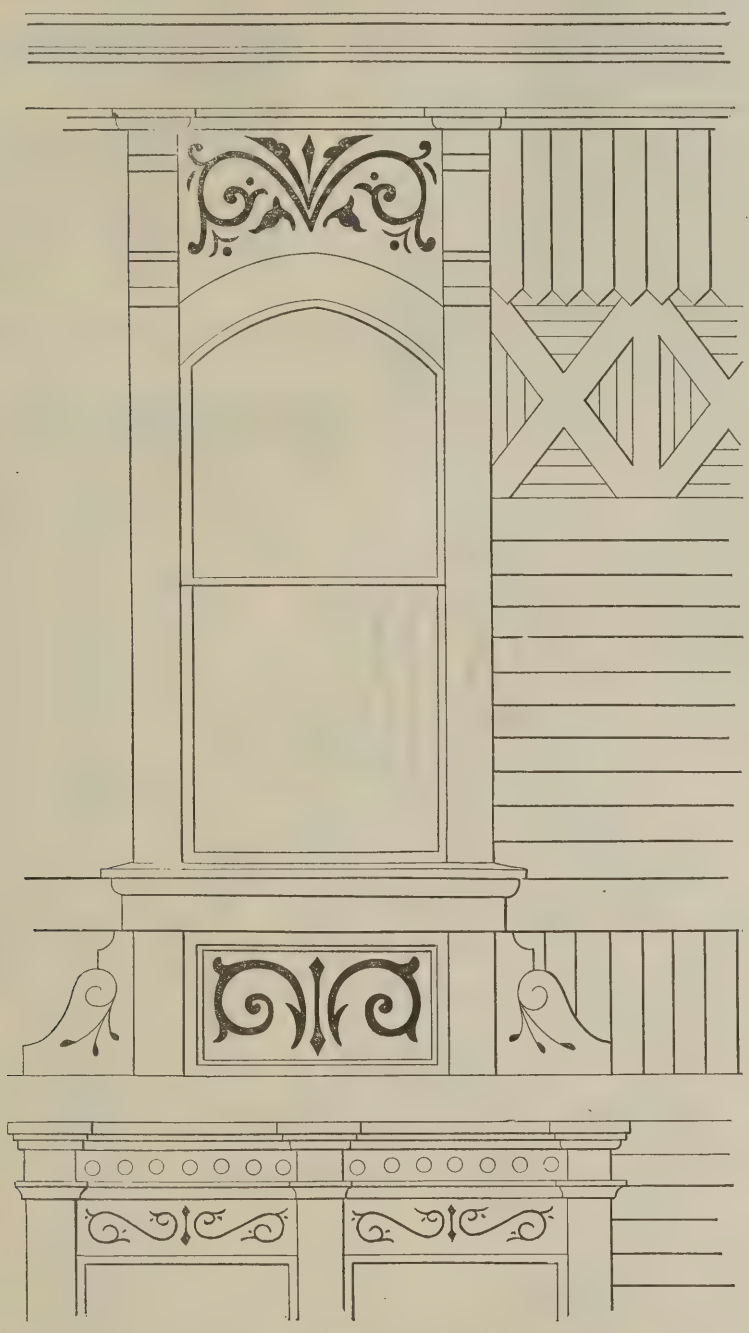
No. 57, "Enterprise," Christian G. Vierheilig, No. 44 Porter Block, Grand Rapids, Mich.

No. 76, "Ellery," Timothy F. Walsh, No. 103 Ellery street, Cambridge, Mass.

No. 74, "E Pluribus Tres," John L Wees, 829 North Fourth street, St. Louis, Mo.

No. 68, "Tape," C. H. Lee, No. 409 Walnut street, Des Moines, Iowa.

No. 71, "Economy," W. S. Van Dalsem, No. 1815 West Chestnut street, Louisville, Ky.
No. 80, "Asticou," F. L. Savage, N. E. Harbor, Mt. Desert, Me.

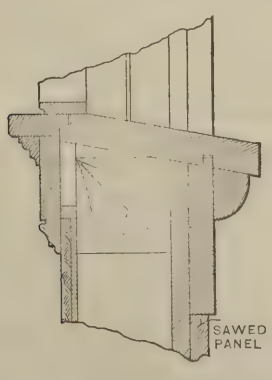


*Details of First Prize Design in the Seventeenth Competition.—Portion of Exterion Wall of Building.—Scale, ½ Inch to the Foot.*

No. 82, "Patria," G. Gerold, Trinidad, British West Indies.

Of the above plans receiving honorable mention the design submited by "Cui Bono" was published in our columns in the May number, and that of "South" in the number for April. Some of the others will appear in future issues.

A certain number of plans submitted in this competition were evidently from amateurs, builders who are attempting to do a little in the way of designing, and students of architecture. Several have requested criticism of their efforts, stating that they have no expectation of a prize, but desire to ascertain in just what position they stand relatively. The Committe of Award passed these requests by, and have left the Editor without the benefit of their suggestions and criticisms, which he would be glad to have, in order to base upon them certain remarks which seem appropriate under the circumstances. As it is he will attempt to answer some of the questions which have been thus presented, and will perhaps refer to other points as well, but this must be postponed to another issue.




*Section Through Window Sill.—Scale, 1½ Inches to the Foot.*

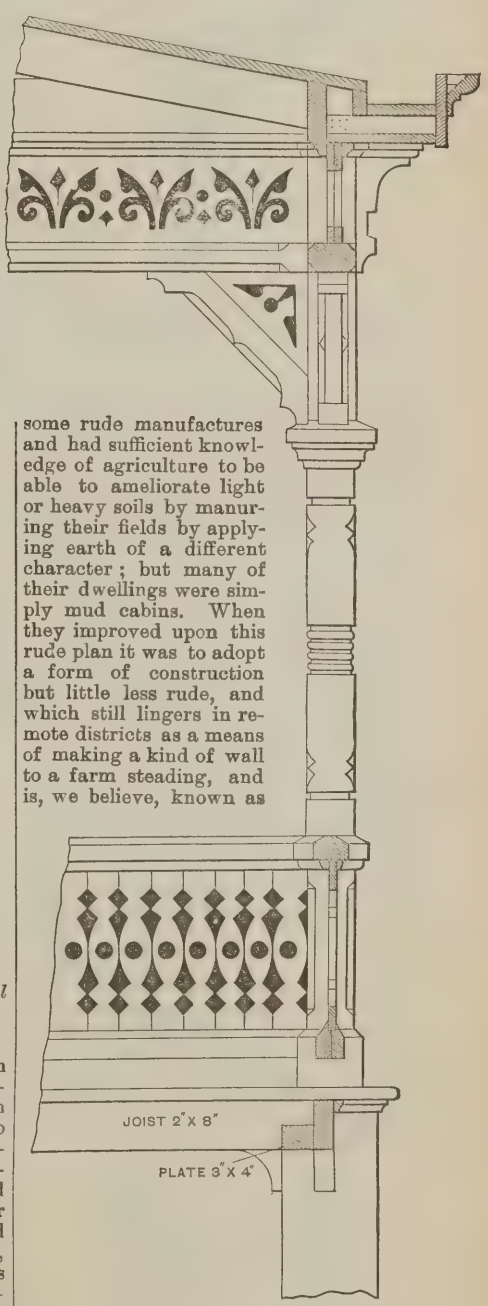
J. C. Flood's residence near San Francisco is spoken of as the most expensive private residence in America. It is of brownstone. The interior decoration cost $800,000.

Lumber dealers in the Saginaw Valley, Mich., complain of unusual dullness, a great change having come over the market during the past month.

## History of the Modern House.

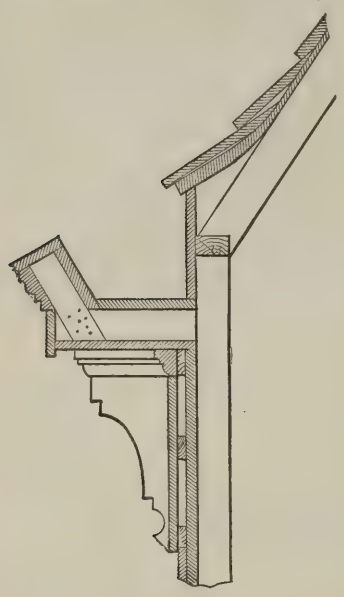
One of our English contemporaries has been considering the pedigree and history of the modern house. At the outset attention is directed to the crude structure which must have been the habitation of the aboriginal Britain. From this point the development of the house, resulting in the spacious and stately device of the present day, manifoldly divided, and replete with contrivances for comfort and luxury, is traced. A reprint of the article will no doubt be of interest to many readers. While the American house is not in all respects identical with the English house, there are so many points of resemblance as to make the account of interest even to American readers:

So far as we can glean from Cæsar and other Latin authorities, our ancient British predecessors were but poor builders. They had a certain civilization, for they practiced some rude manufactures and had sufficient knowledge of agriculture to be able to ameliorate light or heavy soils by manuring their fields by applying earth of a different character; but many of their dwellings were simply mud cabins. When they improved upon this rude plan it was to adopt a form of construction but little less rude, and which still lingers in remote districts as a means of making a kind of wall to a farm steading, and is, we believe, known as "wattle and daub." Let us briefly describe the probable plan of building an ancient British dwelling by this process. A rude circle having been struck on the site, the builders purveyed themselves of a number of tough ash or other saplings of a straight and tapering description and equal length. Holes were next dug at equal intervals on the circle already traced out, and in these the butt ends of the poles were inserted, the holes filled up with earth and stones and well rammed down. When all the poles



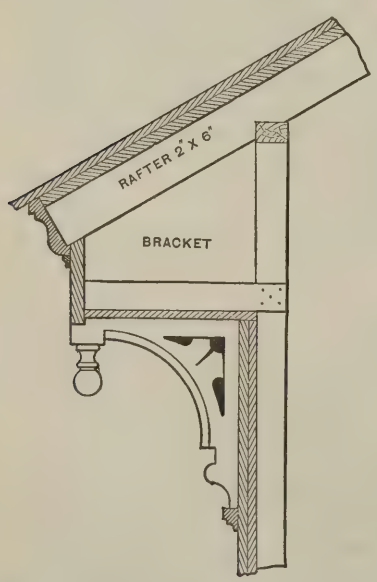

*Detail of Piazza.—Scale, ½ Inch to the Foot.*

were thus planted, a wooden hoop of diameter a little less than the circle traced out for the foundation was placed inside the stakes at a hight of about 9 feet from the ground. The supple tops of the ash poles were bent inward over this, and all brought



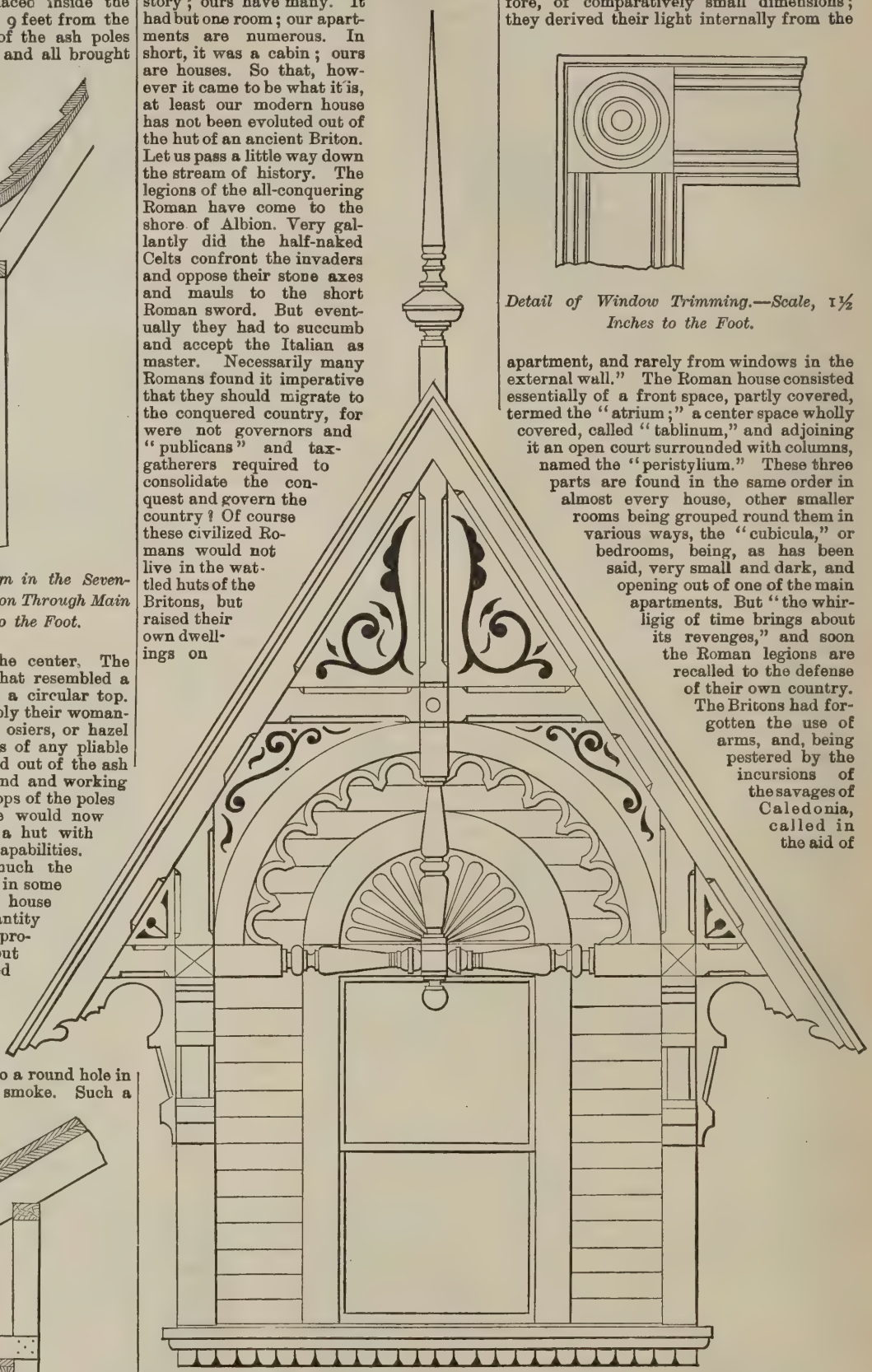
*Details of First Prize Design in the Seventeenth Competition.—Section Through Main Cornice.—Scale, ½ Inch to the Foot.*

together and secured in the center. The entire structure now somewhat resembled a big wooden birdcage with a circular top. Next, the builders, or probably their womankind, procured a number of osiers, or hazel or sallow switches, or rods of any pliable wood, and laced these in and out of the ash poles, beginning at the ground and working up to the point where the tops of the poles were secured. The edifice would now present the appearance of a hut with very tolerable sheltering capabilities. It would resemble very much the wattled hurdles still in use in some parts of England. But the house was not yet complete. A quantity of tenacious clay was next procured, all stones picked out and the mass trod or pounded to temper it. With this the wattled walls were then thickly plastered within and without. It now only remained to cut a low entrance in the wall, and also a round hole in the top for the exit of the smoke. Such a




*Section Through Tower Cornice.—Scale, ½ Inch to the Foot.*

habitation was probably by no means a despicable one, but it certainly was in no sense the genesis of our modern English house. It was low; ours are high. It was round; ours are square. It had but one story; ours have many. It had but one room; our apartments are numerous. In short, it was a cabin; ours are houses. So that, however it came to be what it is, at least our modern house has not been evoluted out of the hut of an ancient Briton. Let us pass a little way down the stream of history. The legions of the all-conquering Roman have come to the shore of Albion. Very gallantly did the half-naked Celts confront the invaders and oppose their stone axes and mauls to the short Roman sword. But eventually they had to succumb and accept the Italian as master. Necessarily many Romans found it imperative that they should migrate to the conquered country, for were not governors and "publicans" and tax-gatherers required to consolidate the conquest and govern the country? Of course these civilized Romans would not live in the wattled huts of the Britons, but raised their own dwellings on



*Elevation of Gable of Side.—Scale ½ Inch to the Foot.*

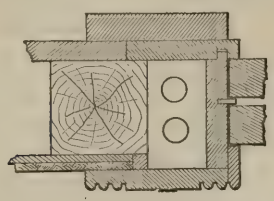
the lines of those which they had inhabited in their native land. It is true that the difference of the climate of sunny Italy and that of our brumous island, "where waves the silver willow," was very great, but the Roman was both a hardy and adaptable animal, and he soon raised in Britain villas precisely similar to those which he erected in Italy. Let us look at one, as far as it can be reconstructed from remains discovered at Pompeii and Herculaneum, and the descriptions of Vitruvius, Pliny and Cicero. Judging from these an ordinary Roman house does not appear to have been either a comfortable or well-arranged building. "The size of the 'cubicula,' or bed-chambers," says Mr. Hudson Turner, "was usually sacrificed to the 'atrium,' and they were, therefore, of comparatively small dimensions; they derived their light internally from the



*Detail of Window Trimming.—Scale, 1½ Inches to the Foot.*

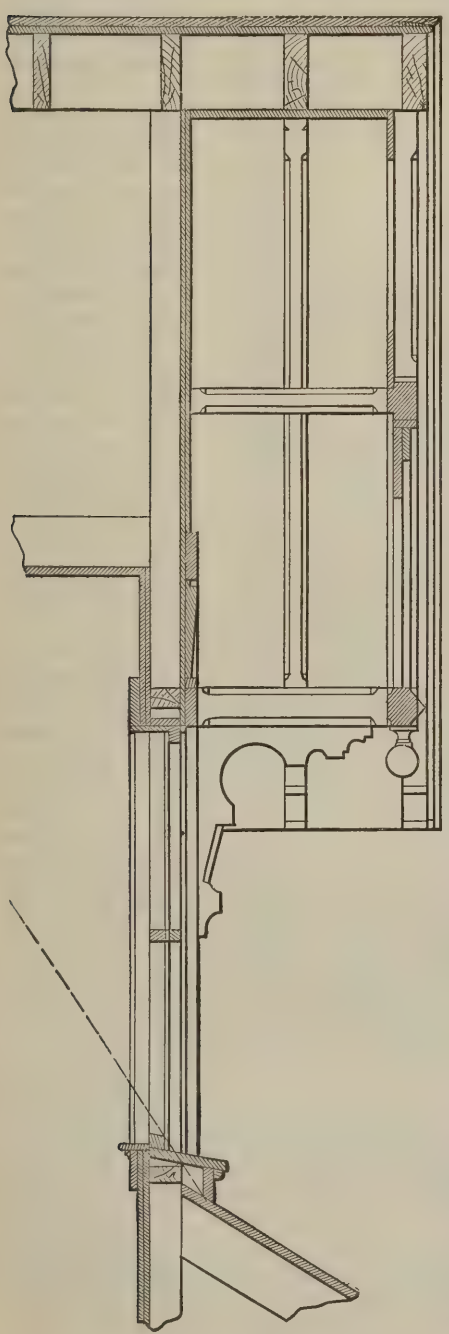
apartment, and rarely from windows in the external wall." The Roman house consisted essentially of a front space, partly covered, termed the "atrium;" a center space wholly covered, called "tablinum," and adjoining it an open court surrounded with columns, named the "peristylium." These three parts are found in the same order in almost every house, other smaller rooms being grouped round them in various ways, the "cubicula," or bedrooms, being, as has been said, very small and dark, and opening out of one of the main apartments. But "the whirligig of time brings about its revenges," and soon the Roman legions are recalled to the defense of their own country. The Britons had forgotten the use of arms, and, being pestered by the incursions of the savages of Caledonia, called in the aid of the Saxon and Norwegian sea rovers to fight for them as mercenaries. But these fierce pirates soon perceived that the land was fair and fertile, and therefore they seized it for themselves with scant ceremony, and Britain soon became Saxon. Now, indeed, we come to the first rude type of the modern English house. The Saxon, besides being a grand and terrible warrior, was also a good mechanic. That he was an able shipwright is vouched for by his great fleet of large war galleys. In his native north dark pine forests were abundant, and he viewed their trunks as the most suitable material for building his house of. Then, as now, the houses of Scandinavia were

most beautifully constructed of wood. So the Saxon would not put up either with the cheerless mud hut of the Briton, nor the



*Details of First Prize Design in the Seventeenth Competition.—Horizontal Section Through Box Window Frame.—Scale, 1½ Inches to the Foot.*

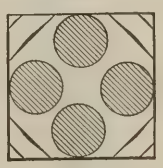
solid stone halls of the Roman, but, finding forests abundant in his new settlement, at once proceeded to build wooden houses such



*Vertical Section Through Gable.—Scale, ½ Inch to the Foot.*

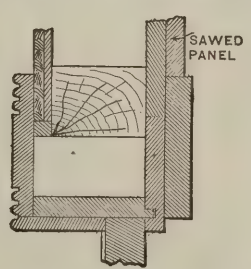
as he had been used to at home. With regard to the usual dwellings of the Anglo-Saxon, Mr. Hudson Turner observes: "The Saxon thane built his 'hall' from the wood on his demesne, by the labor of his bondsmen. It was thatched with reeds or straw, or roofed with wooden shingles. In plan it was little more than its name implied, a capacious apartment, which in the daytime was adapted to the patriarchal hospitality of its owner, and formed at night a sort of stable for his servants, to whose rude accommodation their master's was not much superior in a small adjoining chamber."

Next came to our island the more highly-cultured Norman. The baron and noble had learned to erect massive castles, both for his own defense in baronial squabbles and at places where he might incarcerate prisoner or serf; but the lower ranks of the invaders had much the same architectural ideas as had the Saxons (being, of truth, of the same kin), and they found the more substantial of the houses in the island so much to their taste that they simply turned out the Saxon occupiers and owners and inhabited them themselves. Gradually,



*Horizontal Section on Line A B Through Newel Post.— Scale, 1½ Inches to the Foot.*

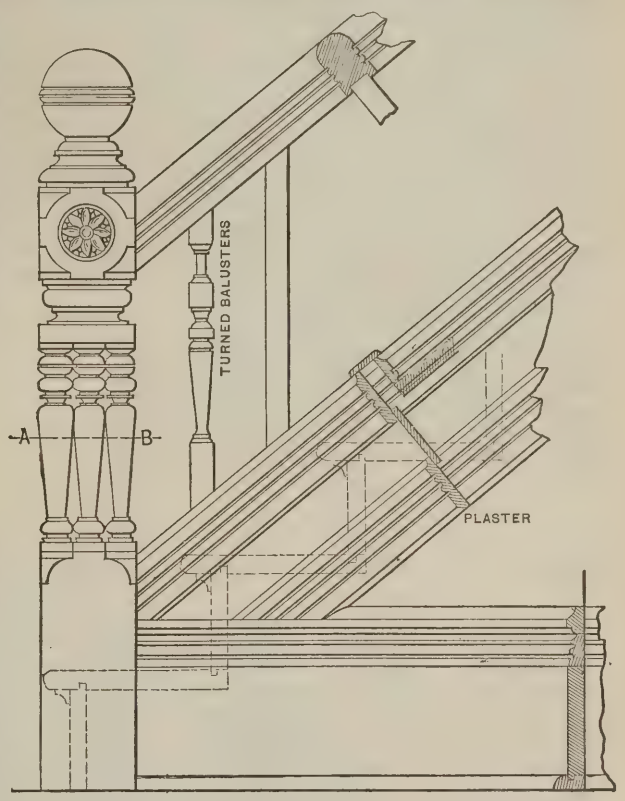
of course, they made improvements upon them, and this process went on during the whole of the Middle Ages, but substantially the domestic architecture of the Saxons was also that of the Normans. This is to be accounted for, not only by the fact that the Saxons and Normans were closely connected by racial ties, but also by the further fact that the men who conquered England were soldiers, not workmen. As an excellent authority




*Vertical Section Through Head of Window Frame.—Scale, 1½ Inches to the Foot.*

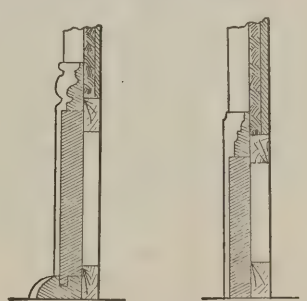
remarks, "It is not to be supposed that the Norman invaders were attended by legions of architects and masons, who began at once to reconstruct every edifice on the island. It took William some years to consolidate his power, and the only buildings of importance erected during that unsettled period were fortresses. That, like the Saxons, the Normans continued to build, in towns, of wood and mud-clay, in timber framework, is beyond doubt. Houses of stone were then, as they have generally been, exceptions to the general method of construction. The cost of the latter material, and the still greater expense of converting it, must have necessarily limited its employment in domestic buildings to the more opulent." The description, therefore, given of a Saxon house is tolerably applicable to any English house of a superior class pretty well through the Middle Ages. At first the really good houses were only found in the occupation of nobles. Then the inferior aristocracy imitated their betters. Next the franklins, or country gentlemen, were ambitious of similar dwellings on a rather smaller scale. The prosperous merchant of the towns, as his wealth increased, saw no reason why he, too, should not be better lodged; and so the model of any building improvement filtered down until at last it reached the cot of artisan and peasant.

Viewing, then, the ordinary home of a stable yeoman or citizen as the type from which our modern house has been gradually




*Details of Stairway.—Scale, 1 Inch to the Foot.*

evolved, let us look at the characteristics of one of the ancient dwellings. The mansion of the Middle Ages consisted primarily of a large general apartment called the "hall," which was the origin of the modern word "hall," as applied to a country residence. A valuable writer, Alexander Necham, or Nequam, who lived under the reigns of Henry II, Richard I and John, in describing the various parts of a house enumerates the hall, the private or bed chamber, the kitchen, the larder, the sewery and the cellar. His notice may be applied generally to all domestic buildings of any magnitude in the twelfth century. It may here be mentioned that early during the Norman period it is evident that a second story was added to the house. The hall (Latin *aula*) was, as we have mentioned, the largest and most important room in the ancient house. It served both as dining-room and drawing-room by day and was the dormitory of the retainers at night. Some of these halls were very large, and their roofs were supported by stone or wooden pillars. The private or




*Section Through Base Finish.—Scale, 1½ Inches to the Foot.*

bed room (there frequently being only one), was situated on the second (or upper) story, and was called from an early period the "solar" or "sollore;" the chamber beneath

it, on a level with the hall, was called the "cellar," and used as such. It would appear that there was no internal communication between the cellar and the solar, access from the latter to the hall being had by stairs of stone or wood within the hall or its exterior. As to the kitchen, Necham remarks it was wont to be placed nigh the road or street. Accordingly we may observe, in illuminations of the twelfth century, that the repast is brought into the hall apparently from a courtyard. Of the position of the larder or buttery nothing can be said; it was probably annexed to that part of the hall which Necham terms the "vestibule," like a buttery batch to one of our collegiate halls. In the house above described (and bear in mind that it was the mansion of a gentleman) we can see the germ, and perhaps something more than the germ, of our modern house. Still, how wide is the discrepancy between them! How utterly void was the ancient house of convenience, with which we could not dispense! There was no passage of any kind, but you entered from the road at once into the general room or hall; there was but one upper story, and this contained only one room, the "solar" or sitting and bed chambers of the master and mistress; there were no glazed windows, only one chimney or fireplace, no water supply or pump, no sink, no water-closet.

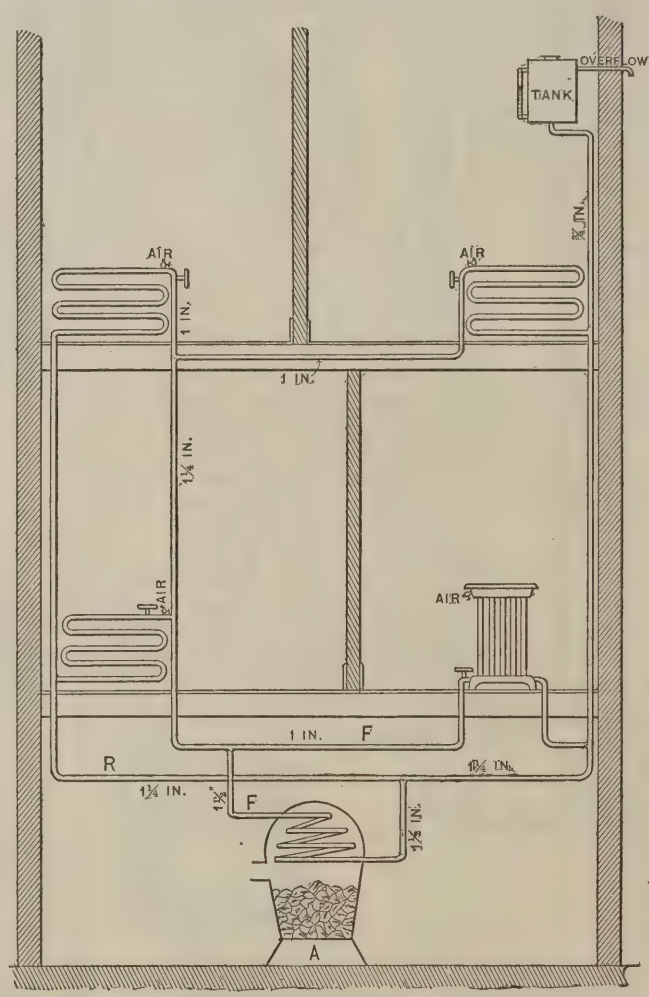
(To be continued.)

## Career of an American Architect.

The death of Mr. Henry H. Richardson, of Boston, which occurred April 28, affords an opportunity of comparing the career of an American architect with what it might have been had he practiced in France or in England. The professional work of Mr. Richardson lasted scarcely 10 years. Although he was a practicing architect for nearly twice that period, the building of Trinity Church in Boston 10 years ago was the work which made him known to all Americans interested in art as an architect of striking force and individuality. The career thus auspiciously begun has been pursued in a series of works by which the promise of his first important essay has been amply redeemed, until, at the time of his death, Mr. Richardson was known to the members of his own profession, in Europe as well as in America, as one of the chief forces n modern architecture.

The position of a gifted and trained American architect is in one respect more enviable than that of a practitioner in Europe. Convention and tradition do not oppose him in the same degree. Convention and tradition are very wholesome restraints upon ambitious ignorance, and the absence of these restraints is responsible for the wild vulgarity which much of our architecture exhibits as compared with the contemporary architecture of Europe, of which the commonplace is at least tame and decorous. But, on the other hand, an architect competent and ambitious to design modern buildings finds himself hampered in Europe by the restraints from which an American architect is free. If Mr. Richardson, after graduating at the Ecole des Beaux Arts, had practiced his profession in France he would have found it impossible to produce the works by which his fame has been secured. The goal of a French architect's ambition is the position of Government architect, and this position can be attained only by conforming to the canons of Government architecture. The official architecture of France, highly developed as it has been under a system of patronage more elaborate and a popular interest keener and more general than are given to architecture in any other country, is yet by this same encouragement made and kept a highly formal, artificial and conventional product of French civilization. Aspiring French architects chafe under the restraints to which nevertheless they must sumbit or lose their best chances of employment and reputation. In England, although there is no authoritative body, as in France, to repress individuality and to compel conformity, the same result has been brought about, in ecclesiastical architecture at least, by the superstition that archæological accuracy is the same thing as artistic unity.

An American architect who has anything to express finds himself, therefore, much freer than an English or a French architect to express himself without reference to any other than self-imposed standards. The Provençal Romanesque which Mr. Richardson adopted and modified in Trinity Church he has since in the main adhered to, although he has developed it in many respects beyond the recognition of the old Provençal builders. In his later works there is more and more distinctly evident a recurrence with the structural forms of French Romanesque to Byzantine detail and decoration. We need not discuss whether this combination is a better starting point for a modern architect than the thirteenth century Gothic in which until lately English architects worked, or than the official style of France, which, indeed, can scarcely be described as a starting point, having already been carried, apparently, to all the development of which it is capable. It remains to be seen whether, in other hands than those of Mr. Richardson, the form language in which he composed will prove itself an adequate means of expression. So far as we may judge by the imitations which his success has stimulated, the results of such an experiment are likely to be merely rude and clumsy. It was not to the style in which he wrought, but to his own artistic individuality, that the brilliant success of Mr. Richardson's architectural achievements was due; to the simplicity, boldness and freedom with which in every work of his some leading feature is emphasized to an impressive and memorable object, and to the skill with which the lesser features are subordinated and united to this. The artistic sense and the artistic skill which enabled the architect to do this were personal and incommunicable gifts.




*System of Hot-Water Heating Practiced by S. Ducolin, Norwood, N. Y.*

# CORRESPONDENCE.

### Hot-Water Heating.

*From* S. DUCOLIN, *Norwood, N. Y.*—My attention was drawn to an article in the March issue, by "H. W. C.," of Redwing, Minn., on the subject of hot-water heating, and to the Editor's reply thereto, with illustrations. As I have followed the business of hot-water heating for some years past and have given the subject careful study, perhaps I may be allowed to relate my experience and express opinions upon points referred to in the article. The manner of fitting the coils as shown in Fig. 1, being a sketch from "H. W. C.," is not a good one, as all the water must pass upward through the coils of both floors and into the expansion tank before it can return to the furnace. This is objectionable for at least two reasons—first, it does not allow the water in each coil to return to the furnace to be heated. It causes it to pass from one coil into another and then to the attic before it can return, and of course the water constantly cools during this passage; second, by this plan it is impossible to heat one room without heating all above it. There are times when one room is required to be kept heated and another to be kept cool, or at least different degrees of temperature are desired in the two rooms. The diagram that you present in Fig. 2 remedies these difficulties in some respects, but I think it is open to criticism. Your plan has the objectionable feature of inability to heat one room without heating others. A further objection to the plan is that the water is carried to the top or highest coil first, and then begins its downward course to the furnace, passing *en route* through the coils in the room below. The result is that the upper rooms get the benefit of the water at its hottest point and the rooms below suffer in comparison, as they get the water only after it is cooler. The very opposite of this is the end sought, for it is the nature of hot air to rise.

My plan is to connect the top of each coil with a flow-pipe and the bottom of each with a return, and put in a valve in each coil at such a point as will permit the closing of any coil without interrupting the circulation in other coils. This is illustrated in the accompanying diagram. I connect my expansion-pipe to any one of the return pipes wherever most convenient. I use a glass gauge on the tank, and put in an overflow-pipe near the top of the tank, to provide for the rapid expansion of the water caused by boiling, but if other details are carefully observed there is very little danger of this occurring. By this arrangement of pipes and a proper amount of heating surface there can be no failure. The question of radiating surface is the all-important one, and in this connection I must differ from your Montreal correspondent, for, while there may be some rooms in a house

PLATE XXI.

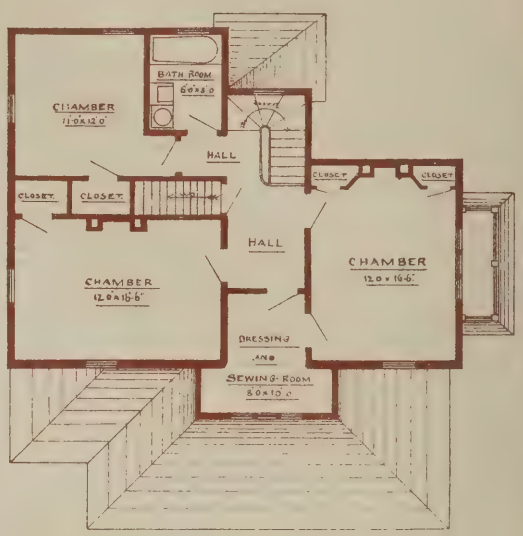
PERSPECTIVE VIEW

FIRST PRIZE DESIGN, SEVENTEENTH COMPETITION.

· POHL & SIMONSON, ARCHITECTS. ·

WASHINGTON, D. C

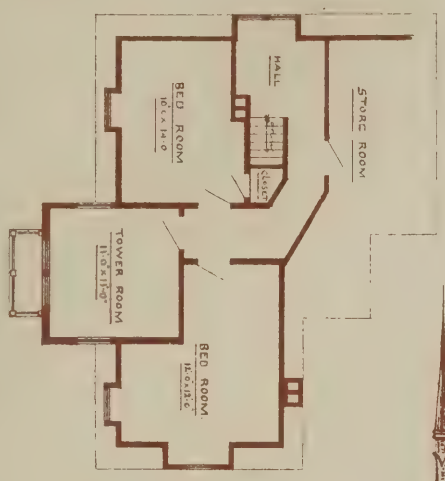
FIRST FLOOR PLAN
SCALE:
1/16 INCH TO THE FOOT.



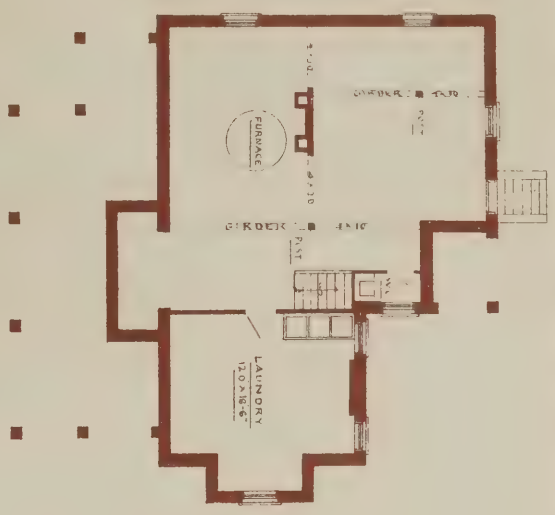

SECOND FLOOR PLAN.
SCALE:
1/16 INCH TO THE FOOT.



FRONT ELEVATION, POHL & SIMONSON'S DESIGN.
SCALE, 1/8 INCH TO THE FOOT.

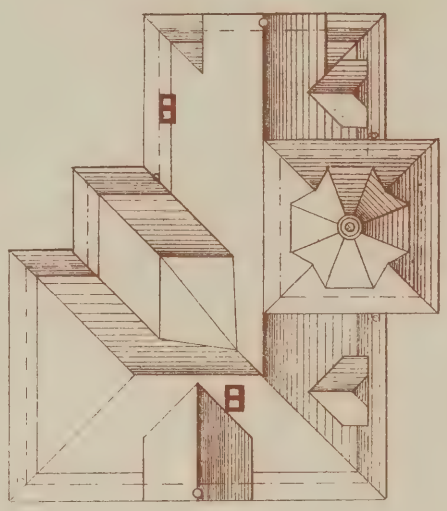



ATTIC PLAN.
SCALE:
1/16 INCH TO THE FOOT.




FOUNDATION PLAN.
SCALE:
1/16 INCH TO THE FOOT.

SIDE ELEVATION, [RIGHT]. POHL & SIMONSON'S DESIGN.
SCALE 1/8 INCH TO THE FOOT.



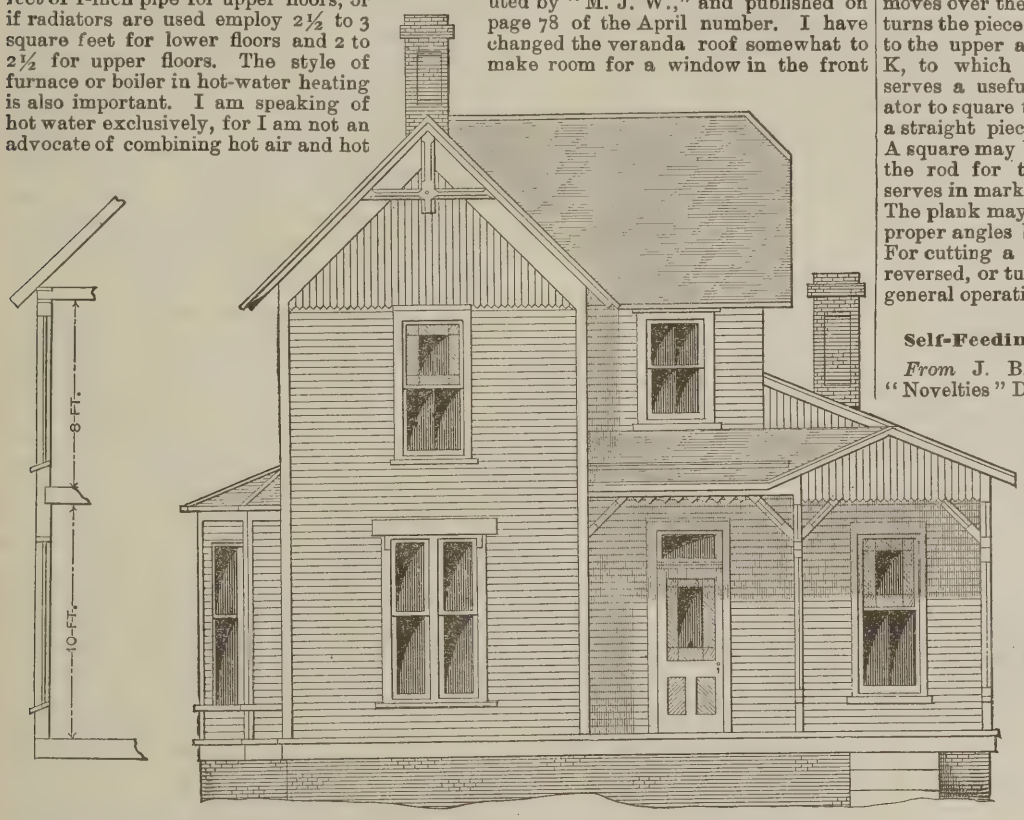
ROOF PLAN.
SCALE:
1/16 INCH TO THE FOOT.



SIDE ELEVATION, [LEFT]. POHL & SIMONSON'S DESIGN.
SCALE 1/8 INCH TO THE FOOT.

where 5 lineal feet of pipe to 100 cubic feet of space will answer, there are very few houses where the rooms are constantly occupied that can be made comfortable with that allowance. Some houses are colder than others, owing to features of construction; accordingly, it is always better to give the benefit of the doubt to the extra radiating surface. Plenty of radiating surface is a good investment when the cost of fuel is taken into account. My rule is as follows: For each 100 cubic feet of space give 8 to 10 feet of 1 inch pipe for lower floors and 5 to 7 feet of 1-inch pipe for upper floors, or if radiators are used employ 2½ to 3 square feet for lower floors and 2 to 2½ for upper floors. The style of furnace or boiler in hot-water heating is also important. I am speaking of hot water exclusively, for I am not an advocate of combining hot air and hot water. In my estimation the two do not work together harmoniously in all kinds of weather. I have seen different kinds of boilers in operation and have found none that are so well adapted in all places in which they be used as the pipe boiler or tubular furnace. I believe it to be the most economical with respect to fuel of any in use. The quantity of piping exposed to the fire is an important item for consideration. Your Montreal correspondent cites some cases where about 3½ feet of 1¼-inch pipe are allowed per 100 feet of coils and mains. While this may work satisfactorily in some cases, yet if three times that amount of furnace pipe was allowed to the same lengths of coils the results would be better from the same amount of fuel. There would also be less tendency to noise from the water boiling. My experience is that each 100 feet of coil or its equivalent in radiators should have 6 to 7 lineal feet of 1½ inches furnace heating surface. This conclusion is the result of a series of experiments made with respect to this one point.

There is one other point to which I would like to refer with regard to the furnace. The common opinion of inexperienced persons is that in a small house, where comparatively few feet of coils or radiators are used, a small pipe for furnace heating will answer satisfactorily. In larger jobs they would employ a larger size of pipe in the furnace. As a rule this is a mistaken notion; in fact, the very opposite would be nearer right. Where the water is cut up into small bodies in the furnace, leaving a very small quantity to circulate through the coils, the tendency to constant boiling is much greater than if the same quantity of water is in larger bodies. On the other hand, a greater number of coils circulating a larger quantity through the furnace from different parts of the house will to a great extent do away with the tendency to boiling, although the water may be cut up into smaller bodies in the furnace. In my own practice I frequently use 1¼-inch pipe for large jobs, but I favor 1½-inch for smaller jobs. I heartily indorse your remarks to the effect that, as hot-water heating becomes better understood, it is likely to be more extensively employed.



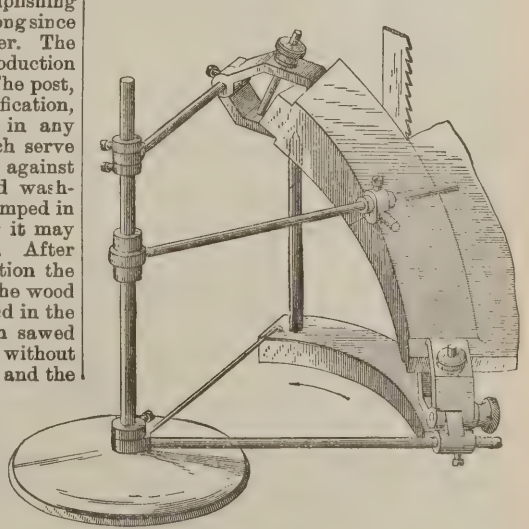

*Elevation of Frame House to Plans by M. J. W., Published in the April Number. Submitted by J. L. Nichols, Bloomington, Ind.*

### Frame Cottage.

*From* J. LINK NICHOLS, *Bloomington, Ind.*—I inclose an elevation of a frame cottage corresponding to the ground plan contributed by "M. J. W.," and published on page 78 of the April number. I have changed the veranda roof somewhat to make room for a window in the front hall. A house built to the plans referred to and corresponding to the elevation inclosed would cost in this neighborhood at the present time about $1000.

### Sawing Stair Rails.

Referring to "S. W. J.'s" method of cutting wreath-piece, published in the April number, it may be of interest to lay before our readers the description of a guide for accomplishing this purpose which was patented not long since by S. Burnell, of Anacortes, Wash. Ter. The accompanying engraving is a reproduction of Fig. 1 of his patent drawings. The post, according to the inventor's specification, is preferably made round and set in any suitable standard. The arms, which serve as guides and holders, are secured against the posts by means of set-screws and washers. When a piece of wood is clamped in the position shown in the engraving it may be turned by a post, A, as a center. After the wood has been put in this position the clamp is taken to a band saw and the wood is fed against the saw, as illustrated in the cut. When the outer edge has been sawed the lower clamp may be loosened without disturbing its position upon the rod, and the apparatus may be moved so as to bring the saw within the arms. It may then be used to saw the inner surface and form the inside curve. The marking arm K is employed simply to show the operator when the saw is running correctly. The inventor says that this marking device is an important feature of the invention, as it dispenses with all need of marking a plank for any given portion of a stair rail. The saw runs vertically and in the path of which the post is the center. It forms a spiral cylindrical surface for the section of the rail that is set in the apparatus at the exact pitch required for the stairs. When the inner and outer surfaces have been thus formed the inventor takes the pieces from the clamp and forms the upper and lower faces by first marking the thickness. This he does by means of a thin strip of material which will spring or bend to fit the curved surface of the piece. He makes this strip of the required width and lays it upon the inner curved surface. When it is in this position he marks by its edges lines indicating the thickness. He then takes the piece to the band saw and lays it upon the table, with the outer curve down, and feeds it to the saw. As the twisted, curved surface moves over the plain surface of the bed it turns the piece so as to give the proper twist to the upper and lower surfaces. The rod K, to which the pencil is attached, also serves a useful purpose in aiding the operator to square the piece at either end where a straight piece of rail is to be connected. A square may be adapted to be attached to the rod for this purpose. The rod also serves in marking the rail to cut the joints. The plank may be placed in the machine at proper angles by means of the pitch-board. For cutting a right-hand rail the parts are reversed, or turned over, end for end. The general operation described is then repeated.



*Guide for Sawing Stair Rails, Patented by S. Burnell.*

### Self-Feeding Shingling Hammer.

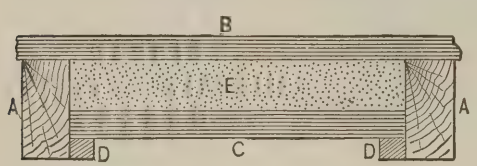
*From* J. B. W, *Emerson, Kan.*—The "Novelties" Department of *Carpentry and Building* interests me quite as much as any portion of the monthly numbers. I have no doubt that other mechanics enjoy it as much as I do. In it we expect to be informed of new improvements, especially new tools. Good tools constitute the principal capital that mechanics have invested in their trade. This leads me to inquire why we are not favored with some allusion at least to some such new invention as a self-feeding shingling hammer or a self-feeding lathing hatchet? Will the Editor kindly give us his opinion whether we "knights of the hammer and saw," living so near to the close of the nineteenth century, are to be deprived of such a practical tool as this would be. Why is the advent of such an article to be delayed for future ages to enjoy?

*Note.*—In reading our correspondent's letter we were impressed with the idea at first that he had some knowledge of a self-feeding lathing hatchet or a self-feeding shingling hammer, and that his inquiry was simply a preliminary to some further mention of the subject. On second reading, however, we became convinced that the inquiry was just what it pretends to be on the face of it, and that the fact that an inventor in another part of the country is at work upon something of this general kind was

only a coincidence. Self-feeding shingling hammers have been in use to a limited extent in certain portions of New York State for some time past, and many experiments have been made with them in order to develop them to a point warranting their introduction to the general trade. We received a circular of one of these interesting tools some time since, and have only been waiting for the perfection of the article in order to lay it before our readers as suggested by this correspondent. The hammer in question is the invention of E. Horton, of Dundee, N. Y. The reservoir of nails is placed above the hammer. The nails are fed from it downwardly through the hammer, so that a point projects for driving, simply by the swinging motion of the hammer as it is wielded. It is a curious little tool, and seems to be constructed upon scientific principles. It is considered a great success for such purposes as nailing boxes, especially in cases where small sizes of nails are employed. Whenever this device is ready for the general market we expect to present it among our "Novelties."

### Building Warm Houses.

*From* H. W. G., *Misha Mokua, Wis.*—I will submit my idea of how to build warm houses. The plan I shall describe is known as the "grouting" method. The sketch illustrates it. A A represents the studding, B the outside sheeting, C the inside grout board, D D strips 1 inch square nailed to the studding to hold the grout board in place. E represents the grout 2 inches in thickness. This is the best and most reliable way to make a frame dwelling-house warm that is known to the trade in this country. We first nail the strips on the studding and then put the grout boards in place as fast as we need them. We do not nail them. We put the grout in all around the building about 18 inches high, and then after making another section ready apply about as much more and proceed in this manner until the plates are reached. This method has the advantage of securing a very warm house and also forming a building that will stand strong winds. The grout makes the building very strong. It has this advantage over the plan of back plastering and does not cost any more than that method.




*Warm Houses.—Sketch Accompanying Letter from H. W. G.*

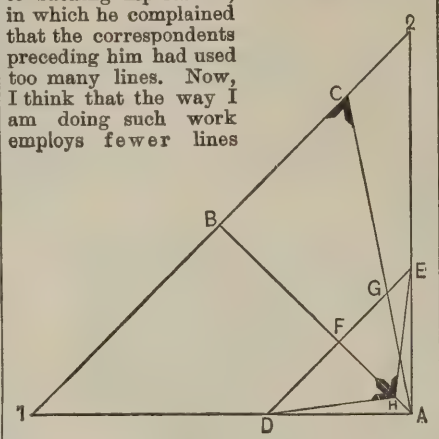
### Protecting Plate Glass.

*From* C. W., *Jamestown, Dak.*—I would like to learn if there is anything more practical than canvas painted with fire-proof paint for hanging before store fronts in the case of fire, to protect the plate glass. In a case which I have in mind the plate glass is 16 feet high and 25 feet wide. Perhaps some of the practical readers of *Carpentry and Building* can afford me assistance in this problem.

*Note.*—We shall be very glad to see this question answered by those of our readers who have had experience in the direction named. The occasions on which such a protection would be serviceable, we imagine, are somewhat rare. In the cities particularly, where plate glass is employed, the buildings adjacent and opposite, against the possible burning of which the protection is needed, are seldom of a character to burn out unless the fire is of such magnitude as would be likely to render such protection as our correspondent names entirely inadequate. Canvas painted with a fire-proof paint, or even if not painted, but kept wet during the progress of the fire, will afford considerable protection. We shall be glad to have this question considered by our readers.

### Backing Hip Rafters.

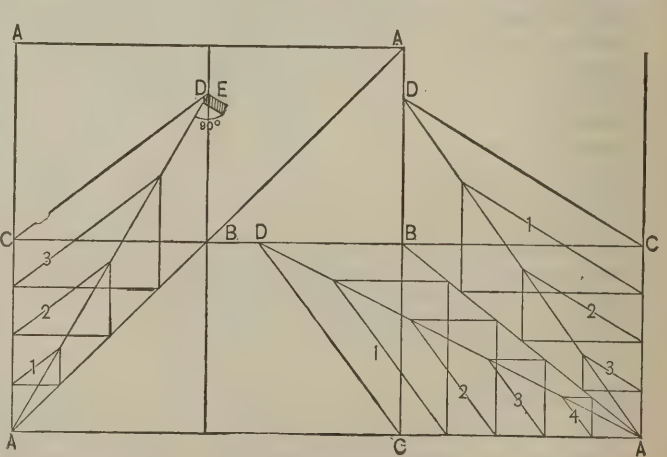
*From* S. E. W., *Brin Maur, Pa.*—I have been a reader of *Carpentry and Building* for a long time past, and have been greatly interested in the hip-rafter problems. In a recent number there was published a communication from "W. S. W." with regard to backing hip rafters, in which he complained that the correspondents preceding him had used too many lines. Now, I think that the way I am doing such work employs fewer lines than the method explained by this correspondent, and therefore I desire to submit it to the readers of the paper. Referring to the accompanying diagram, which illustrates a roof with a square hip, 1 A and A 2 represent the plates, A B represents the seat of the hip, B C represents the rise and C A the length of the hip. Mark out on the plate lines any distance, as indicated by D and E, making these points equally remote from the corner A. Connect D and E, take the distance from F to G on the line last drawn, and lay it off on the seat of the hip, measuring from F, thus locating the point H, and connect H and E and also H and D. These lines give the backing of the hip rafter. This plan will come right, no matter what the pitch of the roof or whether the hip corresponds with the hip of the building or not.




*Backing Hip Rafters.—Sketch and Letter from S. E. W.*

### Hip Rafter.

*From* G. W. H., *Cincinnati, Ohio.*—I have noticed in many issues of *Carpentry and Building* space occupied by the hip-rafter problem. Although I am only a beginner at the carpentry trade, I thought I would send a rule for framing a hipped or valley roof, since I had seen no rules that filled the bill entirely. Some are too scientific, others do not give just what is wanted. Like every one else that has written on this subject, I think my rule is the best. I inclose diagrams in which hips for the two different rises are shown. The scale is ⅛ inch to the foot. The letters will readily explain the rule. Let A represent corners of the building. B represents comb or ridge pole. B C represents the seat or base of common rafter and B D the risers. Draw the line A D; then on it may be found the length of the "cripples" by a series of triangles shown, the "cripples" themselves being indicated by figures 1 2 3, &c. The spaces on the lines A A are to represent the distance from center to center of the "cripples." The backing is shown at E, the bevel being found on line C D, after turning a right angle from line A D and setting the bevel by the right angle and the line C D. The bevels on the ends of the "cripples" at hip or valley, since the rise and run of the rafter are known, can easily be obtained by the mechanic with his square.




*Method of Calculating Hip Rafters Pursued by G. W. H.*

### Partnership Settlement.

*From* W. J. R., *Tracy, Minn.*—Supposing two men enter into partnership to carry on the building business, and only one employs himself on the work in hand at any given time. Suppose that in the work of superintendence one of the partners is employed 10 days and the other 30 days, and that each partner, when not acting as superintendent, would be engaged in ordinary mechanical work on the job. After paying the expense of help, what would be a fair way for dividing the profits? Should the number of days worked by both, namely, 40, be used as a divisor to find the amount per day, and that multiplied by each man's time—that is, 10 and 30 respectively? or should each man's time be multiplied by a certain amount, say $2.50 per day, and the balance be equally divided? I desire to learn just what way would be proper and right.

*Answer.*—We are somewhat at loss to understand the exact nature of our correspondent's question. It would seem from his letter that the men take turns in superintending the work, only it turns out that one man has superintended 20 days more than the other. When not superintending we infer that the members of the firm were engaged as common mechanics on the jobs. If this is a correct statement of the case both men worked the same number of days on the job, the only difference being that one was superintending longer than other. Of course the matter of superintending a building carries with it more responsibility than working in the capacity of journeymen, and ordinarily such work is better paid. Such questions, however, as this are generally anticipated by the articles of agreement leading to the partnership. Either the partners enjoy the profits of the business share and share alike, or else there is some other division growing out of different investments or difference in actual worth of personal services to the business, as may be mutually agreed upon. Perhaps we do not understand our correspondent correctly. If one of the men was engaged 30 days in the work and the other 10, the time of each not put upon the job being employed elsewhere, then it would seem proper that the division of profits should be made on the basis of the time actually spent in the work. It must be evident to our correspondent from the foregoing that it is impossible for us to answer his question definitely. Such things are almost always the matter of an agreement, and what would be fair in one instance would not necessarily be fair in another case. If the same amount of ability was contributed in each case, then it would seem right to divide the profits share and share alike, taking into account, of course, the difference in time actually spent upon the work. If, however, one man was experienced and the other inexperienced, then it would seem fair that the one should have

a larger share than the other. There certainly is no rule or law in cases of this kind which could settle such a question.

### Stair Trimming.

*From* L. M. ALGER, *Mansfield, Ohio.*—I send you some drawings, representing some work which has recently been done in this city from designs which I prepared, which may be of interest to readers of *Carpentry and Building*, The drawings very clearly show the design and the general features of construction.

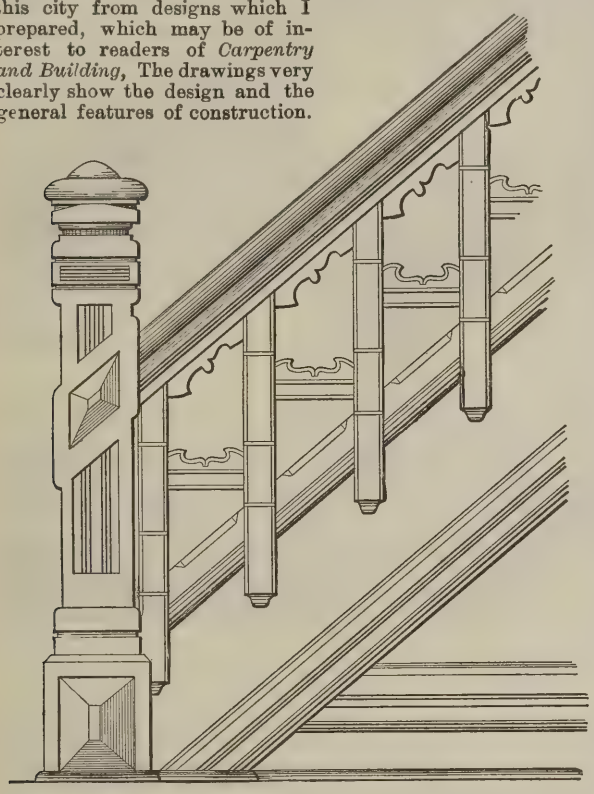


*Fig.* 1.—*Design for Stair Finish, Supplied by L. M. Alger, Mansfield, Ohio.*

*Note.*—The drawings forwarded by our correspondent are full-size details, from which we have had the reductions made which are presented in this connection. The first cut shows a side elevation of the stairs, near the foot, while the second is a detail representing the finish of the outside carriage and against the soffit. The third represents a profile of the hand-rail.

### Marks on a Steel Square.

*From* A. B., *Minneapolis, Minn.*—Will you kindly explain the marks and figures on a first-class steel square? I do not think that there are many mechanics who fully

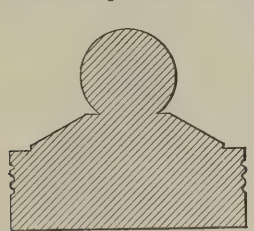


*Fig.* 3.—*Profile of Hand-Rail.*

understand this tool, and I think it will be of benefit to others besides myself if you will explain it in detail.

*Answer.*—The marks on steel squares were thoroughly explained and the subject practically exhausted in our issue for January, 1880. Inasmuch as we can supply back copies to any who desire the same, we do not think it necessary to repeat the description at this time.

### Hexagonal Floor Plans.

*From* F. C. B., *Gardner, Mass.*—I know that different climates require different arrangements of rooms in houses, but until I saw "S. W. H.'s" plans I did not know that the laws of nature prevailing in New England are reversed in Kansas. I was surprised that the draft of the kitchen stove should seem to be made by taking the smoke from it down through the floor and under the cellar stairs before being allowed to enter the chimney. After all it might be a good thing to keep the creosote and smell of smoke down cellar rather than let it out of doors. There would certainly be one advantage in this construction. In the majority of cases there would be no need of a smokehouse for curing bacon. The kitchen would serve an excellent purpose. With regard to "S. W. H.'s" claim for ventilation, I think none will deny that with four outside doors opening directly into the rooms, in addition to a liberal supply of windows, the ventilation is sufficient to be healthy, particularly when the mercury is on the down grade. Another beauty of the plans which the author perhaps forgot to mention is the ample closet-room provided. However, I fail to find any closets at all on the first floor. There are two shown on the second floor, but it looks as though the one in the room at the left of the hall might be a "leetle low studded." The arrangement of using the sitting-room for a winter bedroom is particularly good, especially in case of company, supposing there are young people in the house. Of course the young folks should not mind sitting up in the cold parlor, for there is no chance to warm it except indirectly by the smoke from the kitchen stove by opening the door of the dining-room. After the old folks have retired there would be no other way upstairs except passing through the pantry—an arrangement which I know by experience is calculated to please. A word with reference to the parallelogram laid out for the second floor, and I am done. By reference to the plan it will be seen that the second floor is supported in mid-air by its four corners. There is no support on the sides, and the whole weight of floor, walls and roof of the second story is so placed as to cause it to sag the ceilings of the rooms below. I agree with the Editor that it would have been interesting had the correspondent sent a photograph of the structure, so that we could have seen the external as well as the internal beauties of the structure, but in the absence of a picture we can each guess how it looks. I am well satisfied that a photograph would reveal no chimney outside, since the smoke is all taken down the cellar to smother. After a practical experience in the building business of 16 years I am ready to admit that this is the most original plan I ever saw.

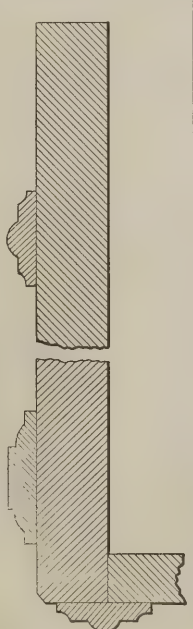


*Fig.* 2.—*Detail of Moldings.*

### Straightening Old Doors.

*From* A. B. M., *New York City.*—In reply to the inquiry from "S. A. P.," as to the methods of straightening old doors, I will explain a plan which I have followed with success. Take out the panel molding on the hollow side and cut a dovetail wedge-shape key to the plowing. Then by inserting a large hardwood key into the opening and driving it hard the wedging will drive the two parts asunder until it is as straight as needed. Care must be taken not to dovetail the key too much, since it is liable to split the stile at the bottom dovetail line or base of the cone frustum. Another method is to rip the stile directly in the center of its width and reverse the outside piece, securing it to the inside by screws or glue, or insert a hardwood tongue so that they will not slide on the edge.

### Estimates of Materials.

*From* D. L. MERRILL, *Union City, Mich.*—For some time past I have had printed on the back of my business card some useful particulars relating to estimates of materials for building purposes. I inclose copy of the card, which may be of interest to the readers of *Carpentry and Building.*

*Note.*—The back of the card printed by our correspondent is as follows:

Four bunches of shingles to the thousand.
Four thousand pine shingles, 16 inches, will cover five squares.
Three thousand pine shingles, 18 inches long, will cover five squares.
Four pounds 3d. nails to the 1000 shingles.
One hundred and twenty feet pine flooring will lay 100 feet surface.
One hundred and twenty feet pine siding will lay 100 feet surface.
One thousand feet of lath are 2000 pieces.
One thousand feet of lath will cover 120 square yards.
Twelve pounds of lath nails to the 1000 feet of lath.
Fifty pickets 1½ inches square to the rod.
Thirty-five common brick to the foot for chimney—30 of Detroit brick.
Forty of Detroit brick for well per foot, 20-inch circle.
Two and one-half barrels of lime will cover 100 square yards plastering two coats.
One and one-half barrels of lime will cover 100 square yards plastering one coat.
One barrel of lime will lay 1000 brick.
One barrel of lime will lay 1 cord of stone.
One barrel lime, estimate, 5½ yard good sand.
One bushel of hair will do for 100 square yards plastering.
One and one-fourth yards of good sand will do for 100 square yards plastering.
One-third barrel plaster will hard finish 100 square yards.
One barrel water lime will build a 35-barrel cistern.
Two barrels water lime will cement cellar bottom 16 x 24.
Fifty pounds building paper will cover 60 yards.

## REFERRED TO OUR READERS.

### Cypress Wood.

*From* G. J., *Coopersburg, Pa.*—Will some practical reader of *Carpentry and Building* give me some information about the qualities of cypress? The planing mills in this neighborhood are introducing a kind of wood called "cypress," and I would like to know concerning it how it will stand the weather. Is it apt to contract or expand? The samples that I have examined appear to be very far from seasoned, and seem to be very apt to draw in moisture during rainy weather.

### Mechanical Swings.

*From* W. A., *Baxley, Ga.*—I have seen wooden swings worked with a treadle. The treadle motion is very slight, yet quite enough to swing well. I am not ingenious enough to be able to construct such a swing without the assistance of a drawing or a description. Will some practical reader of *Carpentry and Building* help me in the matter?

### Oil Finish.

*From* S. R., *Grossbeck, Tex.*—Will some practical painter supply in *Carpentry and Building* directions for oil finish on walnut furniture? I have been attempting to read up on the subject, but fail to find the method sufficiently in detail to enable me to accomplish the work. I want to know all about the materials to be used. I am living in a small town, where the opportunities for learning such things are not abundant. What I have in mind is the finishing of walnut furniture as usually done in the large

factories. I should like to have the information, so that I may be able to proceed to finish a piece of furniture upon which I am at present engaged.

### Molds for Artificial Stone.

*From* J. R, *Trenton, Ont.*—Will some practical reader of *Carpentry and Building* inform me what material is used for making the molds for the manufacture of artificial stone, and also what is used to prevent the cement from adhering to the molds? I would also like to know how to prevent the formation on the surface of a casting of artificial stone of small holes and indentations, which give it the appearance of air bubbles, or rather as though drops of water had occurred between the surface of the mold and the material.

### Bevels on Octagon Roofs.

*From* W. S. W., *Washington, Iowa.*—Will some reader of *Carpentry and Building* furnish a rule for cutting the bevels on cornice and roof boards on an octagon roof of any pitch?

### Carpenter's Gauge.

*From* J. D. L., *South Chicago, Ill.*—I would like to learn where I can obtain W. F. Berry's patent combination carpenter's gauge. I bought one of the patentee something over a year since, and now desire to obtain a duplicate. So far I have failed to learn where they are manufactured or where they can be bought.

*Note.*—On receiving the above letter we made inquiries in this market and in neighboring cities, but have failed to obtain the information that our correspondent requires. If any of our readers can answer his question we shall be glad to hear from them.

### Framing Hip Roofs.

*From* G. P. S.—Some time ago I was working with a mechanic engaged in framing a hip roof. The method that he pursued was new to me, and, although I investigated it as carefully as circumstances would permit, I am still in doubt about it. He first cut his hip rafter the proper length and then squared across the back at intervals by laying jack rafters already heeled alongside the hip. Then by squaring across from the mark he obtained the length of the jack rafters. If any of the readers of *Carpentry and Building* can explain this method in detail he will confer a favor.

### Smoke-Stack.

*From* B. U. T., *Eldred, Pa.*—I should like to see in *Carpentry and Building* a design for a smoke-stack from 80 to 100 feet high, containing a 4 x 4 foot flue, showing the latest and best mode of construction. In the same connection I should be glad to inspect methods of boiler setting.

### Cuts for Hip Rafters.

*From* S., *San Francisco, Cal.*—Among all the methods of framing hip rafters and rules for finding the cuts for the same which have been published in *Carpentry and Building* I have not found any showing means for getting the cut of the lower projecting end of the hip rafter corresponding to common rafters cut square. Will some reader kindly give attention to this question?

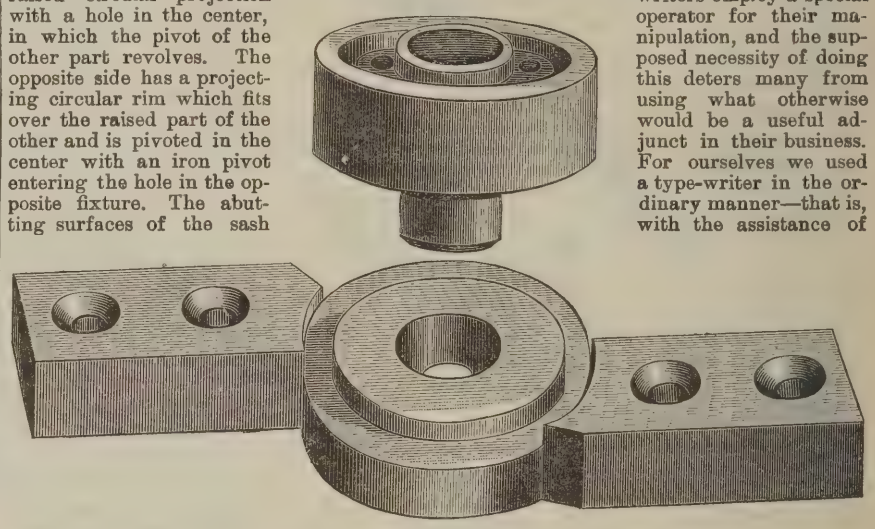
### Cheap School Houses.

*From* J. B., *Black River Falls, Wis.*—I would like to see cheap school buildings discussed. We have a good many buildings of this kind to erect in this country, and accordingly plans of buildings which have been constructed or studies submitted by architects would be very profitable to us. I have never seen anything in *Carpentry and Building* relating to this important topic. Will some of the readers present plans that can be built at from $500 to $2500.

## NOVELTIES.

### New Sash Pivot.

A. G. Newman of No. 1180 Broadway, New York City, has recently put upon the market a sash pivot which is illustrated in Fig. 1. The device consists of two brass castings, one of which is fastened to the frame and the other to the sash, in case the sash is to be pivoted horizontally, and to the sash and sill where the sash is to be pivoted vertically. One part, it will be seen, has a raised circular projection with a hole in the center, in which the pivot of the other part revolves. The opposite side has a projecting circular rim which fits over the raised part of the other and is pivoted in the center with an iron pivot entering the hole in the opposite fixture. The abutting surfaces of the sash and frame, or sash and sill, as the case may be, are rabbeted on opposite edges, so that when the sash is closed a tight fit is made. The use of this fixture secures tight joints that are effective barriers against the entrance of dust and air. This sash pivot is made of different sizes and is applicable to sash from 1½ to 3¼ inches in thickness.



*Novelties.—Fig. 1.—New Sash Pivot.*

### Ayers' Patent Sash Holder.

This article, which is represented in Figs. 2 and 3, is manufactured by the Ayers Patent Sash Holder Co., corner Broadway and Chambers street, New York. This device is intended to hold a window in any desired position, and for this purpose is inserted in the sash so as to exert the desired pressure against the window frame. The construction and operation of the holder require little explanation. The cuts represent it full size. It is, it will be seen, an iron cylinder in which a spiral spring, the operation of which is regulated by a screw, as shown, exerts its pressure upon the projecting bolt or holder with such force that it is claimed that any ordinary window is held at the desired hight by means of two on each side of the sash. The material of which the holder is composed is described as a compound almost as hard as iron, but of such a nature that it will not imbed itself in the wood nor mar the paint. The advantages claimed for this device are that it holds the sash at any spot and prevents rattling; that it is more durable and less liable to get out of order than the cord and weight, and is entirely out of sight; that it is extremely simple in its application, requiring only two holes bored in each side of the sash about 4 inches from the top and bottom in which to set the holders. It is specially adapted to car windows. It is also pointed out that it can be used as a door opener for opening the front doors of apartment houses.

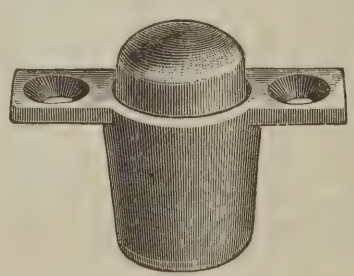


Fig. 2.—General View.

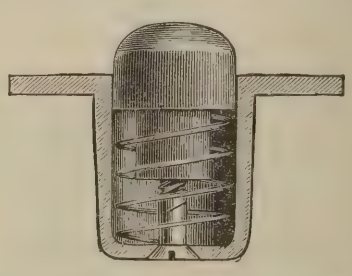


Fig. 3.—Sectional View.

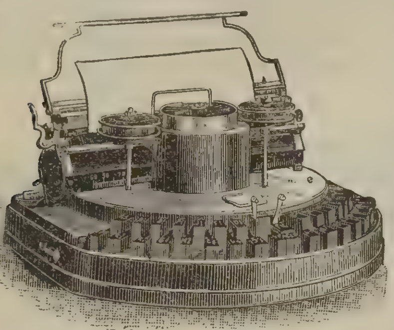
*Ayers' Patent Sash Holder.*

### The Hammond Type-Writer.

The very extensive employment of type-writing machines in architects' offices, as well as in the business offices of contractors and builders, lends especial interest to each new device of this kind that is brought out. For the most part those who use type-writers employ a special operator for their manipulation, and the supposed necessity of doing this deters many from using what otherwise would be a useful adjunct in their business. For ourselves we used a type-writer in the ordinary manner—that is, with the assistance of a hired operator—for several years without feeling any desire to attempt to operate the machine personally. When the Hammond type-writer came to our notice, however, a cut of which is shown in Fig. 4, we felt an interest in it on account of its manifest utility in various features and the general character of the machine. In the necessary experimental work done for the purpose of becoming sufficiently familiar with it to be able to lay before our readers a statement of its advantages, we became so much in love with it that we continued its use for the mere pleasure of the thing, and at the end of a very few days found we were able to write our private correspondence upon it at a speed equal to penwork. Such a result was not only surprising, but gratifying, and we mention the matter in this connection because our experience may be worth something to those who would employ such a machine were it not for the supposed necessity of hiring a skilled operator.

The illustration given herewith will convey to the reader a fair conception of the appearance of the machine. It is smaller than either of the standard machines in general use, and it is also more portable. As sent out by the company it is inclosed in a handsome wood case. The keys are arranged in an arc of a circle around the front of the machine, as clearly shown in the engraving. The action of the keys is very different from that of other type-writers with which this may be compared. Pressure upon the key trips the hammer which makes the stroke, thus relieving the operator from the necessity of throwing the hammer up at each stroke with his finger.

Instead of a blow upon the keys, as seems to be necessary with some machines, a gentle pressure, in some respects resembling the play upon an organ, is all that is required. Since the stroke of the machine is in a measure automatic, the resulting writing has an evenness that is very satisfactory. The type, instead of being in the form of hammers that come up and strike the paper, are so arranged that a single hammer at the back presses the paper against them successively as they are presented by the key movement. The inking ribbon is carried on two horizontal wheels shown supported on standards near either end of the machine. The type are in the form of segments of circles swinging about a central axis.



*Novelties.—Fig. 4.—The Hammond Type-Writer.*

The action of the machine may be briefly described. Upon depressing a key the type segment is revolved until the proper character comes opposite the paper where it is to be printed. This done, the hammer from the back strikes against the letter, and the release of the key feeds the paper one space forward. The position of the paper in the machine is clearly indicated by the cut. The work being done is almost entirely in sight of the operator. The last few letters only are covered and away from the eye, but even they can be revealed by pressing back on the paper below the erasing table, or the knob at the right can be turned to lower the paper so that the letters show below the shield, and this can be done with far less labor or loss of time than is necessary in lifting the carriage upon some other machines. The width of the paper to be written upon is not limited by the construction of the machine. The paper-holder consists of two impinging rolls and is open at both ends, so that wide or narrow sheets may be inserted at will. For addressing envelopes it has special advantages. By the fundamental principle of the machine there is made possible a much wider range of characters than is possible in some other forms. The type-wheels or segments already described may be made in any desirable number of "stories"—that is, there may be one, two or more lines of letters running horizontally around their periphery. Then by raising the type-wheel up one space at a time each of these lines are brought into play. In the regular machine furnished by the Hammond Type Writer Co. three lines of type are employed, although some special machines have been made where four are used. Stops are provided by which the segments are retained at stated positions, thus adopting one set of keys to the printing of three times as many characters. It is a significant indication of the utility of this machine that the editor of a technical work now being prepared for one of the largest publishing houses in this city has had a machine of this kind built especially for his purpose, with extra rows of type on the segments by which the Greek alphabet has been added, as well also as various special marks and characters used in dictionary work to indicate accent, pronunciation, &c. The machine upon which our experiments have been made has all the letters of the alphabet, both upper and lower case, with period, colon, semicolon, comma, hyphen, interrogation point and exclamation point. There is also the character "&." In addition there are brackets, quotation marks, asterisk, dollar mark, pound sterling, cents, dagger, apostrophe, all the numerals, percentage mark, and the following fractions: ¾, ⅞, ⅝, ½, ⅜, ⅛, ¼, ⅓ and ⅔. This range of characters is as large as is ordinarily required in business, and affords many advantages not possessed by other machines which we have investigated.

The machine is not limited to one style of type. The type-wheels or segments are easily taken out and put back, and as many extra wheels, thus affording a variety of type, are furnished with a machine as may be desired. The Hammond type-writer, we are informed, at the New Orleans Exposition was commended for superiority in speed and facility in operation, combined with perfect alignment and impression. It was also commended for great range and capacity of work, with simplicity and durability of mechanism. The makers are the Hammond Type-Writer Co., 135 Centre street, New York.

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### Chandler's Chamferer.

Fig. 5 shows a common draw-knife, with a chamfer guage applied, which Chas. A. Strelinger & Co., of Detroit, Mich., are introducing to the trade. The chamfer gauge consists of a casting that slips over the blade and is held by a thumb-screw at the top. Two of these castings are employed, one of which is slipped against either face of the angle to be chamfered. The depth of the chamfer, accordingly, is regulated by the space apart at which these gauges are set. The gauges are furnished handsomely nickel-plated and are of a size to fit ordinary draw-knives. For many purposes where chamfering is wanted at short notice, and where it can be better done by a draw-knife

*Fig. 11.—Chandler's Chamferer.*

than any other tool, these gauges would seem to answer a very desirable purpose. At the same time they admit of work being done by a draw-knife in competition with other means for accomplishing the same thing.

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### Joslin's Resawing Machine.

In Fig. 6 we show a new circular resawing machine built by the S. A. Woods Machine Co., of 91 Liberty street, New York. It was designed by Mr. Isaac R. Joslin, and, while retaining the general features common to this class of wood-working machines, embodies a number of improvements and points of novelty and interest. Mr. Joslin has paid special attention to the roller mechanism of the machine, which controls the feed of the board to the saw and regulates its action, and it

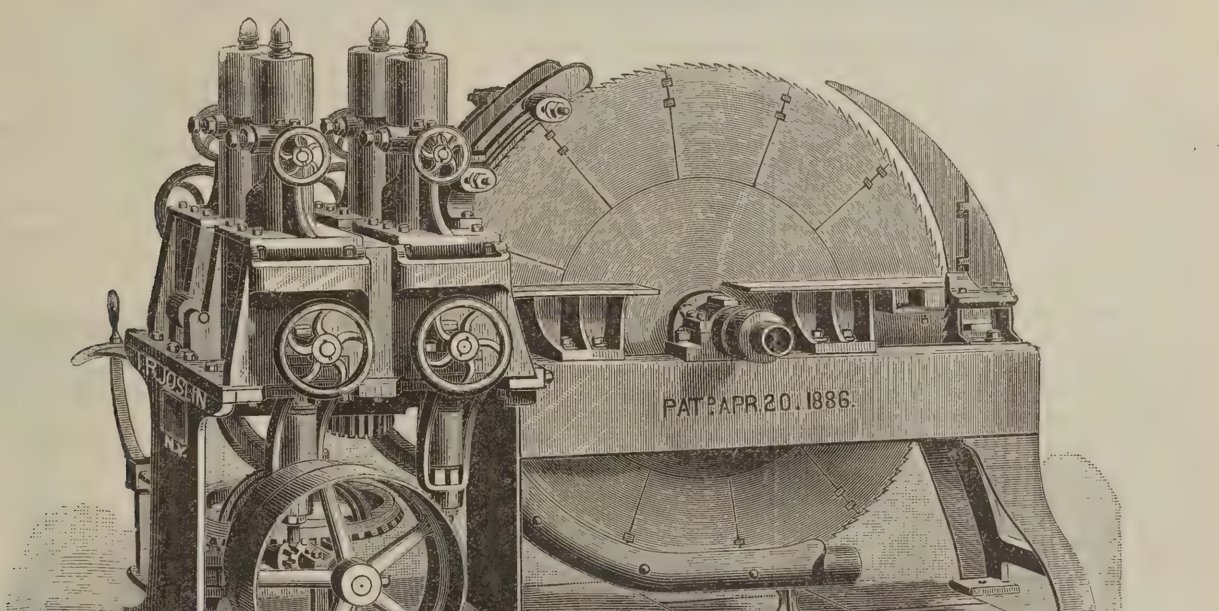



*Fig. 6.—Resawing Machine with Segment Saw, Built by the S. A. Woods Machine Co., N. Y.*

is there accordingly that the special novelty of the design is to be sought. It is of importance, naturally, in a machine of this kind that these feed-rollers should hold the board firmly and present it to the saw accurately, so as to prevent as much as possible lateral pressure, which would tend to deflect the saw and impair the accuracy of the work. Absence of this pressure further permits the use of a thin saw, thus avoiding wide kerfing and accomplishing an important saving in lumber. Mr. Joslin has met these requirements in a most satisfactory manner and has mounted and connected the rollers in such a way as to make them very sensitive to irregularities in the board, and free to move equally in opposite directions. Perfect self-centering of the board to the saw is thus obtained and an even division of the board is insured. The machine is constructed, as usual, with two successive pairs of feed-rollers leading to the saw, the rollers being mounted on a carriage movable in transverse ways, and accordingly adjustable with reference to the saw. Each roller, however, is mounted in a separate roll-stand on this carriage and capable of an independent adjusting movement toward or from the other, the sliding base of the roll-stands being situated at a distance above the base of its roller at or near the average center of grasp on the average board. The strain is in this way centralized the on slides, insuring a smooth and easy movement of the roll-stand in yielding to irregularities in the board. The rollers of each pair are connected by means of what Mr. Joslin calls an "equalizing bar," which practically is a bell-crank, and they are consequently compelled to open and close in unison and evenly from a common center. Self-centering of the board is thus secured. The bell-crank may be disconnected when desired, and means are provided to hold the rollers on one side rigid while the opposite rollers are left yielding. By this arrangement a board may be easily divided into several slabs. For this work the hand-wheels shown on both sides of the machine are called into play to adjust the rolls independently of each other in the desired position, the large hand-wheel seen on the left enabling the operator to move the feed works bodily across the machine. Thus, it will be seen, these joint and separate movements and adjustments of the rolls are so complete and perfect as to provide for every requirement that may be thrown upon them. As to the feed works, these are made heavy and strong, and the working parts compactly and conveniently disposed, so that all movements and adjustments shall be readily commanded by the operator. A feature of special merit is the method by which the forward and backward feed is obtained by the use of a single belt and the lever seen on the left of the machine. The mechanism by which this is effected is in the form of a clutch engaging or disengaging appropriately disposed gearing. It is simple, strong and durable, and not liable to become disarranged. The frame is cast in two pieces bolted together in such a manner that they may be taken apart readily for convenience in shipping. It is also so designed that the operator may approach close to the saw blade to file and set the saw when necessary without climbing on the top of the frame to reach it. All the shafts in the machine are of steel and the saw flange is of hammered steel, to insure proper stiffness and at the same time allow of a thin flange. The machine is furnished with either a segment blade, as shown in the engraving, or with a solid saw, and with either solid or inserted teeth, as the user may prefer. The inserted teeth are made as light as 17 gauge, and the solid teeth as light as 21 gauge, though the makers recommend for rough, hard work a saw of 18 gauge. Four sizes of this machine are built, differing in the size of saw and weight of machine.

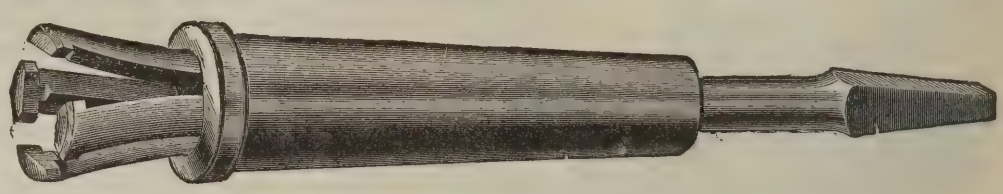
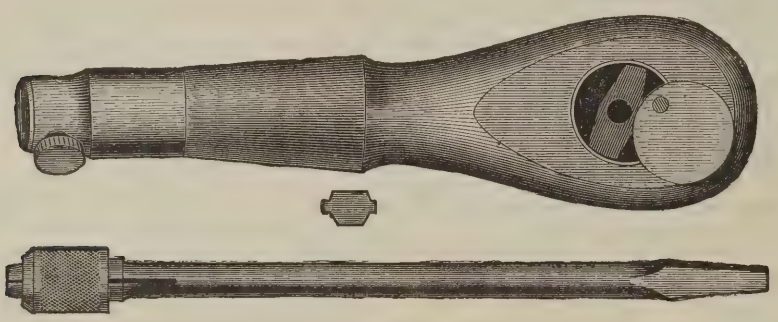


*Fig. 8.—Sellman's Adjustable Socket Wrench.*



*Novelties.—Fig. 7.—Pratt's Multiform Screw-Driver.*

### Pratt's Multiform Screw-Driver.

In Fig. 7 we show a new form of screw-driver, just introduced by the Millers Falls Co., No. 74 Chambers street, New York City. Unlike most screw-drivers the stock is detachable from the handle. The handle, therefore, serves the useful purpose of holding the stock furnished with it or any other tool that may be advantageously employed in it, as, for example, a brace bit, a reamer or a chisel. The stock of this tool is provided with a chuck which firmly holds the driver points, which are put in and out instantly by turning the sleeve. Ten bits or points are furnished with the tool, either end of which may be used, thus making the one tool equal to 20 screw-drivers in all. These points are made of varying widths and thicknesses, so as to fit any screw from the largest to the smallest. They are made flat on both sides, so they are not liable to slip out of the slot or work off the screw-head. The points, except the one in use, are conveniently stored in the box provided for them in the handle. In addition to the screw-driver points the manufacturers furnish a flat countersink for wood or iron which fits the chuck, thus increasing the range of the work for which the tool is adapted. The chuck is of such a character as to hold a variety of small tools, such as twist drills, in case it is desired to employ them for any purpose. The stock is of a kind to be used in a brace where there is a large number of screws to be driven. The stock is held in the handle by a round-head thumb-screw, clearly shown in the engraving. The handle is of polished rosewood and 7 inches in length. The stock is ⅜ inch around, and is of highly-polished steel, heavily nickel-plated. It is the same length as the handle, making the tool some 14 inches in all when the two parts are combined. In appearance this article is attractive, and its utility is unquestionable. The makers have arranged to send it by mail to those who cannot obtain it from their regular hardware dealers.

### Adjustable Socket Wrench.

Fig. 8 illustrates a form of adjustable socket wrench which is being introduced to the trade by H. G. Sellman, of South Lyon, Mich. The wrench is arranged with a square shank for use in an ordinary bit brace. The chuck is of such construction that the four fingers shown in the engraving are forced outward by a spring and are contracted by being pushed inward. Accordingly, on being set over a square-headed nut and pushed against they clasp the nut firmly. The wrench is adapted to a wide range of sizes of heads, and at the same time in its parts is of the simplest possible construction. Its efficiency is manifest for all kinds of work in which there are a large number of nuts to be run on or off, as, for example, in putting together machines and tools. Among these may be mentioned agricultural implements, also carriages and wagons. It will also be found a useful addition to a carpenter's kit. The inside faces of the fingers or grips are beveled inwardly, so as to assure firm holding of the nut and to avoid slipping.

### Diamond Trammels.

A form of beam compass that will interest draftsmen and mechanics who have occasion to sweep large circles is shown in Fig. 9 of the illustrations. In construction the article is a radical departure from forms in previous use. The heads are clamped against the bar by turning screws, the milled heads of which are shown in the engraving projecting through the casting just below the bar. By means of this screw the heads are fastened at any required point quickly and securely. In loosening the clamp the nut drops away from the bar, which allows the head to slide freely. Extreme accuracy in setting the tool is obtained by a second screw in one of the heads. By referring to the engraving it will be seen that the point is pivoted directly above the head of the lead pencil, shown in the cut. By turning the nut on the opposite side the position of the point against the paper or other material to be scribed may be varied as much as ¼ inch. In the use of the trammels, therefore, the head is set as nearly right as possible, and then further adjustment is obtained by this means. In the engraving is shown an attachment by which a pencil may be added to one of the points. The construction of this attachment is such that a pencil of considerable length may be inserted and allowed to wear down. It is not necessary to whittle a pencil, to its detriment, in order to insert it in the holder. Four sizes of this instrument are made, the bar of the lightest being ¼ by ½ inch, and of the largest ⅝ by 1½ inches. Charles A. Strelinger & Co., of Detroit, Mich., are the sole agents. The engraving shows the medium size a little more than half full size.

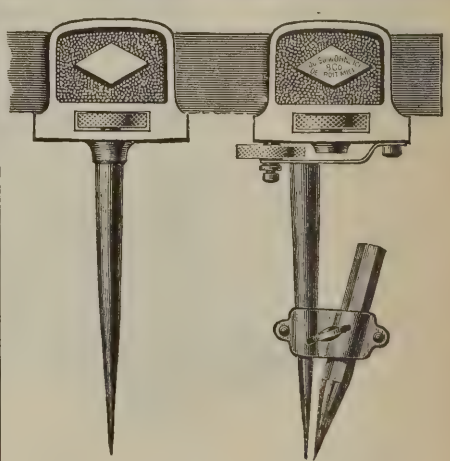
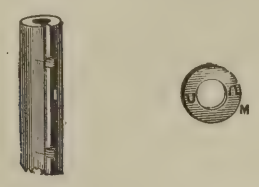


*Fig. 9.—The Diamond Trammels.*

### Non-Bursting Conductors.

W. F. Moulton, of Burlington, Vt., is manufacturing what may be described as anti-freezing, non-bursting conductors and eaves-troughs, and which, although not of very recent invention, will still be novel to many



*Novelties.—Fig. 10.—Moulton's Non-Bursting Conductor-Pipe.*

of our readers. The accompanying engraving indicates the characteristics of the wood conductor which he is offering to the trade. The pipe may be made from either wood or metal. Where wood is employed we are informed that kiln-dried Canada or Michigan pine is used in lengths of 20 or 30 feet, according to circumstances. The conductors are made in two pieces, tongued and grooved together as indicated in the section. One joint is cross-bradded with steel nails, so as to be permanently fastened, while the other is held in place by spiral metallic springs. These springs, while being sufficiently strong to hold the pipe together under ordinary conditions, yield to the expansive influence of ice, and thus open it enough to save it from bursting or cracking. Similar construction is applied to sheet-metal pipes. The latter are made by lapping, and instead of two thicknesses of the metal being joined by riveting or soldering they are held in contact by means of metal springs. In this case, as in the former, when the pipe is expanded by reason of the ice formed within it the spring yields, thus saving the pipe from danger of bursting. The wooden pipe is thoroughly coated on the inside with an asphaltum preparation that makes it impervious to water, and is painted on the outside. The plan of expansion we think will no doubt be novel to many of our readers, although the patent on it was granted several years since. This method has the advantage of returning the pipe to its original shape after the ice is removed.

### Ormsby Sash Balance.

The Ormsby Sash Holder Co., No. 92 Utica street, Boston, are introducing a substitute for weights and pulleys for hanging window sash that they claim has merits over any other system in use. The nature of the device will be understood by comparing it to the spring rollers which are in common use for window shades. A roller is provided above and in line with each sash, and the sash is connected with the same by means of brass ribbons, as illustrated in Figs. 12 and 13 of the engravings. The spring balance may be arranged on windows in old houses where weights and pulleys have not been provided, as illustrated in Fig. 12, and it may be used in the construction of new houses, as shown in Fig. 13. In the one instance it is placed below the top jamb, and in the other case it is boxed into the top of the frame, so as to be out of sight. In the latter construction the molding forming the finish across the top of the frame is arranged to come off by means of screws, thus affording an opportunity for getting at the balance for adjusting it where adjustment is necessary. Where it is not desired to remove the face casing E, as shown in Fig. 13, the pocket may be arranged in the top jamb. Metallic bands attached to the pulleys of the balance extend down through holes in the top of the jamb and connect with the sash by means of spools which are inserted in the sash. The spring used in this balance, we are informed, is made of the best steel,

*Fig. 11.—The Ormsby Spring Roll Sash Balance.*

and is of sufficient length to allow an even tension at all points. It is never wound to its full limit, and therefore there is no special strain upon it. Fig. 11 shows the device attached. The spring F, which balances the sash, is coiled on the arbor. One end is attached to the arbor and the other to the pulley. At each end of the arbor there is a pulley, and the two are connected together by means of the cylinder O. The bands or

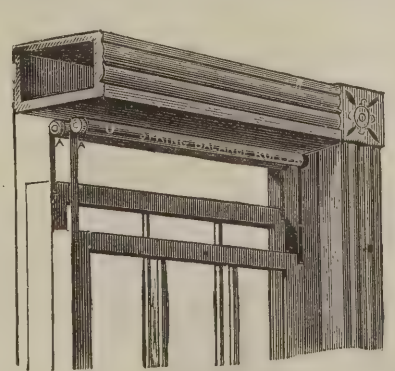


*Fig. 12.—The Ormsby Sash Balance Applied to Old Windows.*

ribbons which connect the balance with the sash are indicated by M. Provision is made by which the balance may be adapted to windows of varying size. It may be increased 2 inches in length by drawing out the pulley P and inserting small screws through the cylinder. The arbor G is made of sufficient length to allow of this adjustment. When the full length of the balance

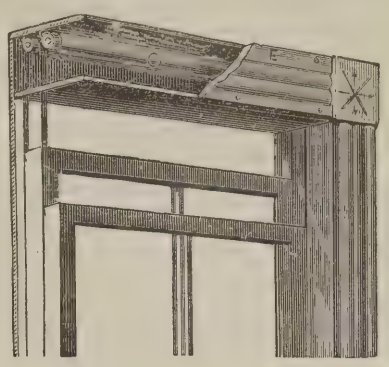


*Fig. 13.—The Ormsby Sash Balance Applied to New Windows.*

is not needed the long end of the arbor is cut off to correspond with the opposite end. The company also manufacture, on this same principle, balances which are applicable to large doors, dumb-waiters and other fixtures working in vertical grooves. The New York office of the company is Room 93, Tribune Building.

### The Triumph Band-Saw Sharpener.

There are various automatic machines on the market for the purpose of sharpening circular saws, but thus far there has been none which was adapted to doing the same work on small band saws. With the growth of the band saw in favor, so that every wood-working establishment has one or more of them, the problem of rapidly and accurately sharpening them has become important. The engraving, Fig. 14, which we present of what is known as the Triumph Band-Saw Sharpener, made by Halladay, Litchfield & Co., of Chicago, Ill., will accordingly prove of interest. The cut represents a No. 5 machine specially adapted for small band saws. The saw is carried on two horizontal pulleys which are adjustable to fit different lengths of saws. The driving-shaft is seen at the back of the machine. It connects by a belt with the shaft on which the emery-wheel is hung, and by means of a worm with the feed-shaft. The feed-shaft carries an eccentric upon which rests the lever by means of which the emery-wheel is raised and lowered as the teeth of the saw are moved into place. The feed-finger is attached to a perpendicular lever pivoted at the lower end, and which is moved by a crank at the end of the feed-shaft. The crank connects with the feed-lever by means of a block worked by the crank in a groove in the lever. The crank can be adjusted to or from the center of the feed-shaft, thus allowing for any distance between teeth. Any desired hook can be obtained. The saw is stationary during half the revolution of the feed-shaft, and during that time the wheel grinds the face of a tooth. While the saw is being moved forward the emery-wheel slowly rises, grinding the back of the next tooth. The framework which carries the saw is adjustable to various widths of saws by means of the hand-wheel and screw

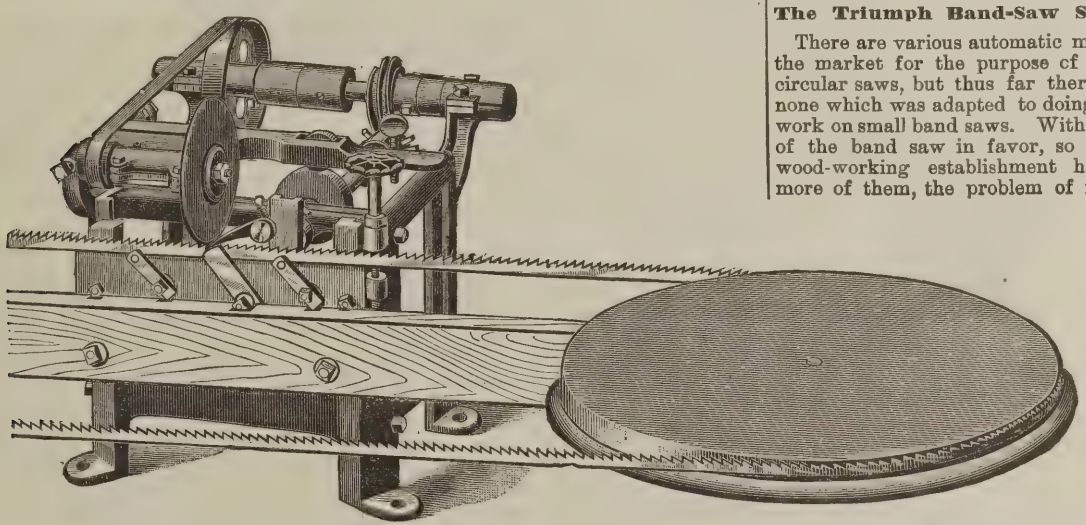
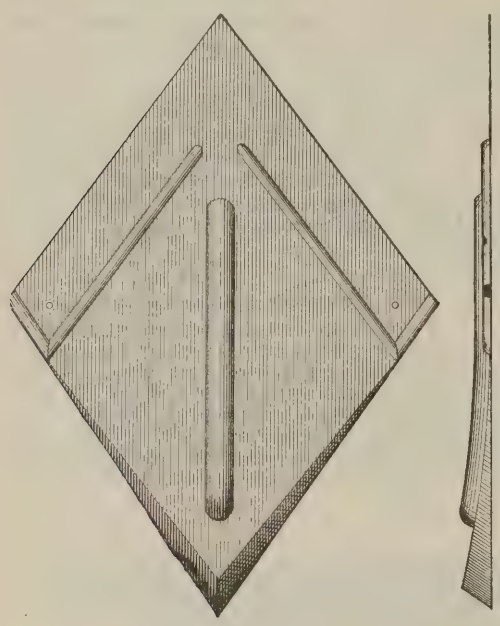


*Fig. 14.—Small Band-Saw Sharpener, Made by Halladay, Litchfield & Co., Chicago, Ill.*

seen at the right front corner of the frame, The gearing of the machine is such that with the driving-shaft running at 1200 revolutions a minute the emery-wheel makes 3300 revolutions a minute, and feeds 100 teeth per minute, the average capacity of the machine. So steady is its motion that an emery-wheel only $\frac{3}{32}$ inch in thickness is used. The New York Supply Co., Limited, 50 and 52 John street, New York, are the agents.

### New Sheet-Metal Shingles.

Mr. J. S. Thorn, of 1201 Callowhill street, Philadelphia, has recently commenced the manufacture of some styles of sheet-metal shingles which have special interest for architects and builders, owing to the fact that, in addition to other desirable qualities, they are somewhat architectural in appearance. By this we mean that as much attention has been given to the design of the shingles



*Novelties.—Fig. 15.—New Sheet-Metal Shingles.—Diamond Pattern.—Scale, 3 Inches to the Foot.*

with respect to their appearance on the roof as to mere features of construction. The object sought in the production of these goods by Mr. Thorn has been to secure in sheet metal, at economical cost, the equivalent of some of the earthen tile which are at present largely employed on account of the character which they impart to the roof. He has sought to provide in sheet metal the equivalent of terra-cotta or earthen tile—that is, securing to a building an ornamental or picturesque roof, while at the same time imposing no burden of weight upon the roof timbers. While achieving these ends, good construction has also been attained. Two designs of this new shingle are presented on this page; still others are in the market or in an active state of preparation. The underlying principle is the same throughout. In Fig. 15 is shown what is familiarly designated as "the diamond pattern" It is lozenge-shaped, and when laid presents the general appearance shown in Fig. 16. Several sizes of this tile or shingle are made, from a very small pattern up to as large as can be struck from an ordinary sheet of roofing tin. The small patterns, in order to avoid a multiplicity of pieces and sections, and consequent labor in laying the roof, are constructed in the form of combination tile, there being four or more patterns in one piece. By this plan the appearance of very small tile is secured, while the number of pieces to be handled in laying is no greater than with a larger pattern. In the style shown in Fig. 15 the beads by which the lapping is made and by which a water-tight joint is secured are alike upon both of the upper flanges. Accordingly in laying the work may be managed either from left to right or from right to left. The lapping of the tile is clearly indicated in Fig. 16. The point of each tile overlaps, and by its peculiar shape is bound down on the two adjacent tiles below. The position of the nailing is also clearly shown. Referring to the profile in Fig. 15, the central longitudinal rib, it will be seen, is concave, thus securing an ornamental appearance, while retaining all necessary rigidity. What may be described as a hexagonal pattern is shown in Fig. 18 and the appearance of a roof covered by the same is shown in Fig. 17. The flanges in this case are unlike on the opposite sides, so that in laying the work the courses are run from right to left, as in shingling or slating. The essential principles of construction, however, are the same as in the other case. These goods are being shipped to the trade, made of the best grades of roofing tin, thoroughly painted before packing.

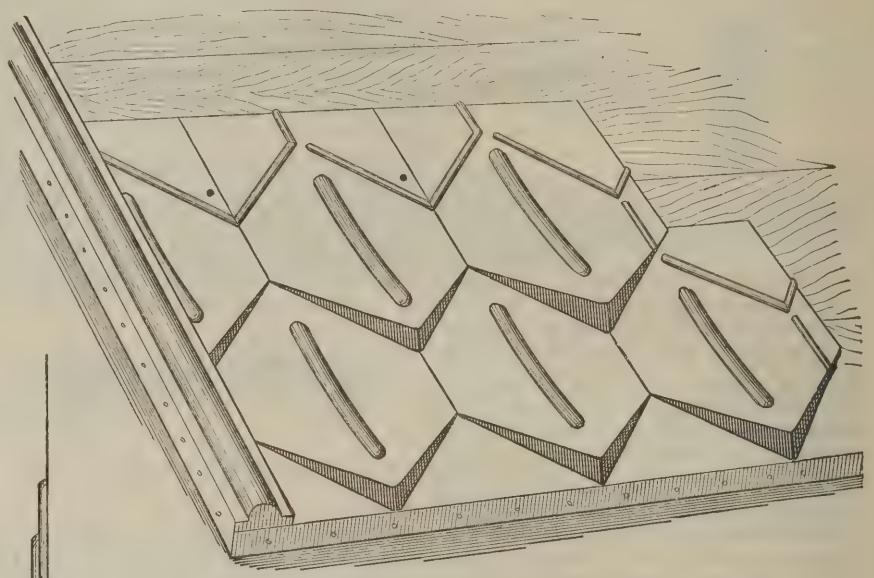


*Fig. 17.—Section of Roof Covered by Hexagonal Pattern.*

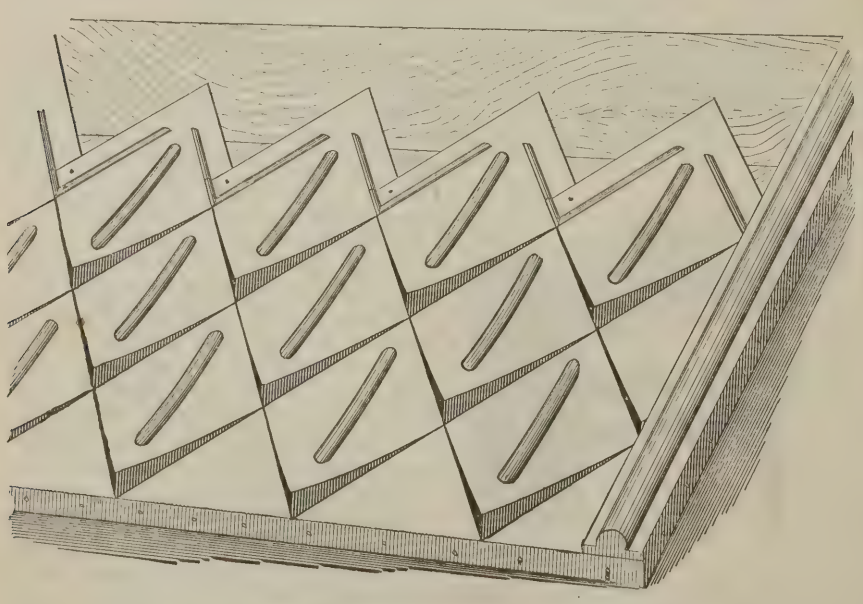


*Fig. 16.—Section of Roof Covered by Diamond Pattern.*

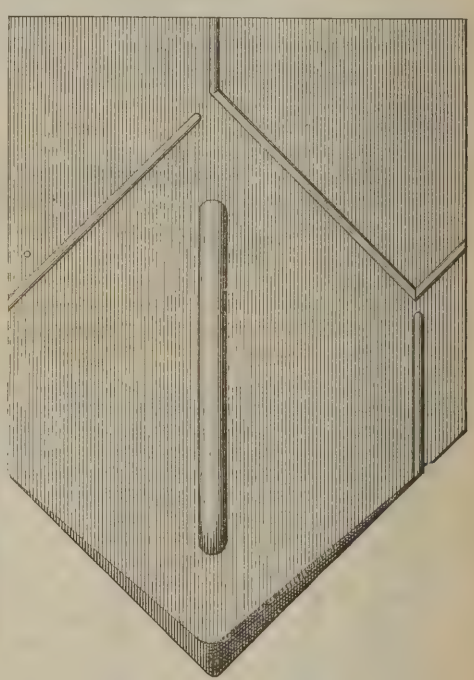


*Fig. 18.—Tile of Hexagonal Pattern.—Scale, 3 Inches to the Foot.*

### Blind-Stile Mortising Machine.

In Fig. 19 we present a new blind-stile mortiser and borer which the Egan Co., of Nos. 221–241 West Front street, Cincinnati, have recently brought out. The machine has been designed to meet the wants of planing-mill managers. In its operations it is automatic and reliable. It is said to be capable of doing a great amount of work and doing it in a first-class manner with

less adjustments and less liability to get out of order than other machines which have preceded it. The spindles, which are made of best cast steel, run in a vertical position, connected to horizontal slides. They are operated by a single belt from an ordinary counter-shaft placed on the machine. The foot mechanism is positive, and is so arranged that the boring or mortising of two stiles at once is accomplished. The work being cut from below leaves the mortise clear from chips. The stiles are mortised and bored in pairs, held in position by an ingenious clamping device while being cut. The spindles are then dropped out of the cut. The stiles are released from the clamping, and are fed forward for the next hole or mortise. The feeding rack is of wrought iron and is placed true, so as to insure perfect work. Mortising may be done at any angle and at any length. Anything from a round hole to one that is 2½ inches in length may be produced. The design compass the distances at which the lines are to be drawn; now copy the design, taking care that each part shall come into the corresponding square of the drawing.

## TRADE PUBLICATIONS.

### Exterior Decoration.

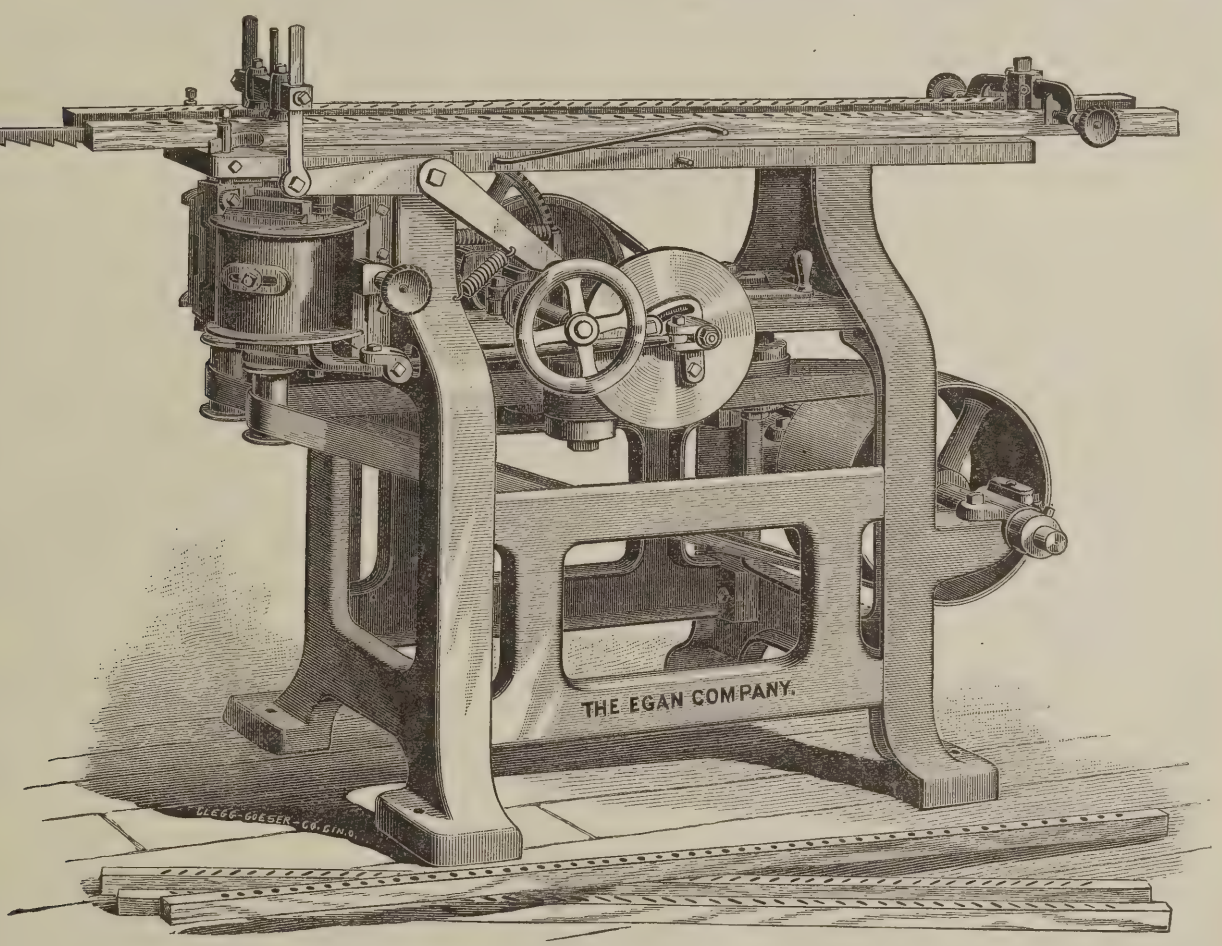
A very handsome work bearing the above title has recently been issued by F. W. Devoe & Co., of New York, and Coffin, Devoe & Co., of Chicago. It is a treatise on the artistic use of colors in the ornamentation of buildings, and comprises a series of designs illustrating the effect of the different combinations of colors in connection with various styles of architecture. The book is oblong, measuring 12 x 15 inches, bound in cloth, with gilt side title, and is handsomely printed on fine plate paper. From the preface we learn that the object of the publishers has been, primarily, to familiarize the public with the true principles of correct and tasteful coloring as applied to the exterior decoration of modern dwellings. It addresses both painters and amateurs. Practical teachings on such a subject, even where available to the fullest extent, the publishers assert, do not suffice where the best results are sought. Theory, on the other hand, cannot be exclusively relied upon. The painter must be something more than a mere manipulator of colors, while the artist must go outside of his school to find the means of utilizing his knowledge of chromatics. The chapters of the text in the work comprise one entitled "Art in House Painting," a second, "The Artistic Selection and Combination of Colors," and a third on "Paints." The latter leads up to the employment of the special ready mixed paints supplied to the trade by F. W. Devoe & Co. The portion of the work in which builders and painters generally will be most interested is the plates, of which 20 are presented. Different styles of dwellings, from those illustrating the most recent whims and caprices of architects to those that bear date of a century since in their characteristics, are presented in colors, and from two to three treatments are illustrated in each instance. A railway station is included among the plates, shown in two styles of decoration, and also an old-time farmhouse. The latter is first shown as it is usually treated, and second as it might be modernized Opposite each plate is a description of the decoration shown, with a key to the colors employed, the numbers referring to the catalogue of F. W. Devoe & Co. At the close of the book a sample sheet of colors is presented, showing the leading shades which are employed in the studies already referred to.

### Wood-Worker's Tools.

We have received from Charles A. Strelinger & Co., Detroit, Mich., a copy of their new catalogue, entitled "Wood-Worker's Tools, Supplies and Light Machinery." The book is comprised in 160 pages, pamphlet form, and is copiously illustrated with cuts of all the standard and special tools which the modern wood-worker is likely to require. The designs are accompanied by specifications of dimensions and a very comprehensive price list, thus making it possible to order from the firm issuing the book anything that cannot be found to equal advantage in local supply stores. To particularize or attempt to enumerate the goods described in this book would require more space than we can devote to the subject. Small machinery, including lathes, circular saws and various other devices, are included. This book gathers in convenient space nearly all of the standard tools and specialties which a very large number of manufacturers are producing. Accordingly its importance to the mechanic is not to be underrated. The book is accompanied by a very comprehensive index, facilitating reference to any part.

### Willer's Blinds.

One of the handsomest trade catalogues, in typographical appearance, that has reached us in a long while is in the new book put out by Wm. Willer, of Milwaukee,




*Novelties.—Fig. 19.—Blind-Stile Mortising Machine, Built by the Egan Company, Cincinnati, Ohio.*

and workmanship of this machine are a new departure in many respects. The makers recommend the machine as being a great labor saver.

Draftsmen frequently are called upon to enlarge or reduce a pattern, geometrical figure, map or design, as the case may be. Almost every competent man has his own particular plan for proceeding in such work, but beginners find there is much to learn before facility of execution is secured. The difficulty in enlarging or reducing is to maintain the same scale of parts. Directions which are sometimes given to amateurs may be of interest to some of our readers who have not had long experience in such work, but who occasionally encounter it: Rule the engraved pattern with a number of colored lines at equal distances, both horizontal and perpendicular, until it is covered with squares; the size of these squares must be determined by the intricacy of the design and the skill of the draftsman; then outline on a sheet of paper a square which will inclose the intended size of the work, and cover it with the same number of squares, measuring off with the

Wis., illustrating Willer's patent inside sliding blinds, a description of which was published in our columns several months since. The book is ordinary octavo in size, bound in paper cover. The general tint of the cover is a light drab, with a center piece representing an interior view showing two windows fitted with the kind of blinds which the book describes. This interior view, together with the legends on the face of the cover, are printed in a brown ink. The margin of the book is a circle of red, while outside is a lighter line of white. Across the cover is a drab color of a different shade from the ground. Mere words fail to indicate the attractiveness of the combination. The inside pages are printed in a brown ink that make them very pleasing to the eye. The illustrations, which are numerous, are well executed and the descriptive text very much to the point. The book is a desirable addition to the collection of trade catalogues on the desk of every architect and builder. The fourth page of the cover has a view of the works in which these goods are made, neatly laid over a vase containing plants of a tropical character. Much taste has been displayed throughout in the preparation of this volume.

### Proportion of Rooms.

Speaking on the subject of proportion of rooms, with reference to their sanitary features, Douglass Golton says: "For purposes of ventilation the hight must bear some relation to the size. Adequate movement in the currents of air cannot be secured in a room unless the hight be proportioned to the width and length. The minimum hight must be fixed with reference to that which will allow the currents of air to circulate without being inconvenient to the occupants. Therefore, in proportion as the width and length of a room are increased, so must the hight be increased. On this account it is not advisable to make rooms much less than 10 feet high. With large rooms, as the hight should be increased in proportion to the size, if the cubic space be the measure of the number of occupants, the area or floor space per occupant would diminish with the size of the room. As, therefore, the hight of rooms is necessarily variable, it follows that it is rather the floor space which must be considered in allotting accommodation to the occupants of a room than the cubic space. In barracks a floor space of from 50 to 60, and occasionally 80, square feet is allowed per occupant. These are for rooms occupied by day as well as for sleeping-rooms. In workhouses, for dormitories, a minimum floor space of 25 square feet has been admitted, provided the ventilation was carefully attended to. In nurseries and servants' rooms from 50 to 60 square feet are desirable per occupant—that is to say, a room 10 feet square, or 10 feet by 12 feet in area, should not contain more than two persons. In schoolrooms which are only occupied during parts of a day, and where the air can be changed between the periods of occupation, a less amount would suffice, and from 15 to 20 square feet are sufficient."

## TRADE NOTES

GUY TILDON, formerly of Alliance, Ohio, has recently issued a neat circular informing his patrons and friends that he has removed to Canton, Ohio, and is now located at No. 32 North Market street, in that place. The first page of the circular contains a very neat perspective view of the Trinity Lutheran Church, of Canton, Ohio, of which Mr. Tildon is the architect.

TALLMAN & MCFADDEN, originally established at 607 Market street, Philadelphia, have recently removed to their new store at 1025 Market street, and by this move greatly enlarged their facilities both for manufacturing and selling. Their new quarters are in one of the best localities in the city, and the building, of which they occupy four floors and the basement, was specially arranged for their business. The wareroom is 200 feet long by 28 feet wide, well lighted and ventilated, finished in oak and ash, and handsomely fitted for the display of goods. Besides being manufacturers and jobbers of a great variety of machines and tools, the firm are exclusive agents for the American Twist Drill Co., Westcott chucks, Crosby Steam Gauge Co., Fay's calipers, Cleveland Rubber Co.'s belting, and are also general selling agents of Gautier cold-rolled shafting.

THE RICHMOND STOVE CO., of Norwich, Conn., and Cleveland, Ohio, have brought out among their new goods this season several styles and sizes of a portable range called the Richmond, which is of special interest to builders and all who have anything to do with the equipment of kitchens These ranges are attractive in appearance, and are fully warranted by their makers. Circulars can be obtained by addressing the company, or Mr. W. C. Higgins, the general manager of the works, at Norwich, Conn.

THE CINCINNATI CORRUGATING CO. are extending their operations eastward as well as in other directions. Their special agent, Mr. D. W. Littell, of Plainfield, N. J., has recently contracted with Cook & Burr, prominent manufacturers of that city, for covering a building they are to erect, which will require 400 squares of corrugated iron. This, we believe, is among the largest sales which the Cincinnati Corrugating Co. have made to private firms in the eastern part of the country.

S. S. BENT & SONS, No. 111 Chambers street, New York, have supplied us with a copy of their catalogue No. 5, which they have recently issued. The goods shown embrace stable fixtures and fittings, brass, bronzed and nickel-plated poultry-yard appliances, dog kennels, door and window guards, &c. The book contains 128 pages, filled with designs of goods which are of interest to builders and house owners in general. It is accompanied by a complete price list.

THE EUREKA STEAM HEATING CO., of Rochester, N. Y., have sent us a copy of their new testimonial book. The pamphlet is very tastefully arranged. It is not a catalogue, although it illustrates the principal features of construction followed by this company. The testimonials are very prettily presented in different styles of type, and show in a very happy manner the estimation in which the Eureka apparatus is held by different house owners throughout the country who have tested it practically. We have also received from the same company their business man's calendar for the current year, including January, 1887. It is arranged in a novel manner, giving not only the day of the month, but also the day of the year, in a minimum of space. The days of the week are given in vertical columns, while the months are presented by horizontal divisions.

ONE OF THE neatest and most attractive pamphlets that has recently come to hand is an imitation scrapbook, recently put out by the Pope Mfg. Co., of Boston. By ingenious methods of printing they have succeeded in producing a 32-page book that to the unitiated would be taken for a scrapbook, at least before a careful examination of its pages had been made. The clippings introduced are from papers published in different parts of the country, as well as extracts from writings of those who have used their bicycles to advantage. We understand that the book will be sent free to any address upon receipt of a stamp, and those who are interested in cycling or in novel features of advertising will find much in this book to command attention.

THE DUPLEX STEAM HEATER CO., with office and salesroom at No. 10 Barclay street, New York City, send us copies of new pamphlets which they have just issued, describing the New American automatic steam heater and the duplex automatic steam heater. The first form of apparatus is described as self-regulating, base-burning, and embodying the latest and best construction for use in different kinds of buildings, both public and private. The Duplex is a surface-burning apparatus, with various features of construction which have been recently patented. The pamphlet describing the latter apparatus is printed in two colors and is very attractive in all respects.

WE LEARN that M. T. O. Allardt, architect, formerly of St. Louis, and more recently of Omaha, has recently been appointed correspondent of the Belgium Société Centrala d'Architecture. The object of this appointment, is, we understand, to facilitate intercommunication between the European societies and the American societies of architects.

MR. S. A. BISHOP, well known to numerous readers of *Carpentry and Building*, on account of the designs from his pencil which have been published in our columns, has recently removed from Smethport, Pa., to Buffalo, N. Y. His office at present is 5 Harvey Building, corner of Main and Swan streets, in that city. In the wider field for his talent which Mr. Bishop has sought we have no doubt that he will be eminently successful.

THE SIDNEY PLANING MILL CO., Sidney, Ohio, have issued a catalogue describing Hill's patent inside sliding blinds. Among the advantages claimed for this form of blind are lightness and superior methods of holding in place. Details of construction, tables of comparative cost and other valuable information will be found in the book.

A PROSPECTUS of the New York Architectural Terra Cotta Co., whose office is in the Potter Building, this city, has been received. This is a new organization, whose works are now in process of erection at Ravenswood, Long Island City. The superintendence of the works is in the hands of Mr. James Taylor, well known to the trade on account of his former connection with the Chicago Terra Cotta Works, the Perth Amboy Terra Cotta Works and the Boston Architectural Terra Cotta Works. The company expect to be ready for business at a very early date.

"A PLEA for Sanitation in Factories and Workshops" is the title of an article written by Wm. Paul Gerhardt for *Mechanics*, and which appeared in the January issue of that journal. It has been reprinted in the form of a neat pamphlet, we believe for general circulation. It treats of topics that are of interest to all who are concerned in the erection of factories or workshops.

MESSRS. HOBART B. IVES & CO., New Haven, Conn., direct attention in another portion of this issue to their sash locks, a sample of which they are prepared to send by mail. They also refer to their door bolt, with which many of our readers are familiar.

THE BUTLER HARDWARE CO. are a corporation recently organized for conducting the business heretofore carried on by Messrs. Butler & Constant, of this city, who are well known to our readers on account of the specialties which they have long been advertising in our columns. The location of the company is No. 18 Warren street, the same as that of the old firm. Mr. John H. Butler is the general manager of the new concern.

CARL TROTSCHE, formerly of Meridan, Miss., and the author of the design published in our April number under the *nom de plume* of "South," has removed to San Diego, Cal. Mr. Trotsche possesses fine ability as a draftsman and designer, and should succeed in the new field which he has selected.

THE DUDLEY SHUTTER-WORKER CO., New York, occupy considerable space in another portion of this issue in the presentation of testimonials from architects and others who have employed their shutter-worker. The satisfaction that many of them express with the use of this device entitles it to consideration upon the part of all who are interested in household conveniences.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

VOLUME VIII. NEW YORK, JULY, 1886. NUMBER 7

## NOTES AND COMMENTS.

LAST month we referred to the cloud no bigger than a man's hand which had gradually overspread the horizon of the business of the country and had broken in a storm of no small violence. The present period may be characterized as the calm which follows a storm, in which the force of the tempest may be estimated and during which the wrecks of demolished structures may be counted. It would be possible now to calculate the damage which has been done were this either necessary or desirable. The air has been made clearer by the storm, and many of the false notions about labor and capital have been blown away or otherwise put out of sight. Since the storm is over men are again going about their usual work, and sooner or later all trace of the disturbance, except the lessons it has taught, will be gone. Business has suffered, and, from the enforced quiet of a month or six weeks since, it is now beginning to put forth evidences of activity. While the situation at present is more encouraging than it was when we last gave it attention, it is still very far from satisfactory. There are substantial evidences of improvement, however, and in many sections the building business of the fall will be almost as good as though no difficulty had occurred. Still, there will be vain regrets that the labor troubles occurred at all. It is uncertain what will be the action on the part of the leaders of the labor movement for the future. Whether wise councils will prevail, or whether mistakes similar to those made early in the season will be repeated, it is hard to estimate at this time. We will hope for the best.

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THE special session of the General Assembly of the Knights of Labor, at Cleveland, does not appear to have been as fruitful of benefits as was hoped. Well-defined internal dissensions seem to have been developed, and the General Master Workman does not appear to have strengthened his position. The element which controlled the convention and secured a majority of the additions to the executive board is not the best element in the order, nor the one most in sympathy with the position taken by Mr. Powderly in his circular letters which have come to the public knowledge through the newspapers. The rupture between the Knights of Labor and the trade unions has not been mended, and for the present they will not pull together. Perhaps this is advantageous. It gives assurance that the Knights of Labor will not be used in the future, as in the past, to make the boycott formidable—or, rather, that they will not allow themselves thus to be used in the interest of a power known to be hostile to anything which it cannot make wholly subservient to its plans and purposes. As an order independent of the trade unions, the Knights of Labor can be of immense advantage to the industries of the country. They hold the balance of power, and are not likely to use it, in the main, unwisely, as they represent many interests and include a large proportion of those not indentified with the trade unions. So far as we can see, there is nothing very disquieting in the results of the Cleveland convention. It would have been better if the Knights had made fewer and less ostentatious deliverances on subjects related to national politics, and had not undertaken to instruct Congress on so many points. However, such utterances are harmless. The membership are not likely to surrender the privilege of voting as they please on election days, and, as no party is likely to embody the Knights of Labor demands in its platform, they will probably not have much influence upon the drift of national politics. That the order has gained nothing in power or prestige from its Cleveland convention seems to be admitted by all concerned. That it has safely passed without serious disaster a crisis in its history is also evident. So far as can be judged, its present attitude is well calculated to discourage professional agitators, and induce them to look elsewhere for a congenial field of operations. This is an important point gained, and it is probably as much as we can expect from a body representing an order of such sudden growth and composed so largely of crude and undisciplined materials.

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ON THE occasion of the regular monthly meeting of the Institute of Accounts, this city, on the 15th inst., the address was delivered by Capt. Henry Metcalfe, of Watervliet Arsenal, West Troy, N. Y. The title of the lecture was "The Mechanical Consolidation of Accounts." The effort proved to be a somewhat popular exposition of the speaker's ideas on organizing and maintaining a system of cost accounts in a manufacturing establishment. The audience was composed of the members of the Institute, invited guests and representatives of the press, and the lecture was listened to with close attention throughout. Capt. Metcalfe's system is essentially an application of the card index, so extensively used in various directions, but upon a very broad and ingenious plan. A carefully considered analysis of the work to be done and the operations necessary thereto form the foundation. Tickets are then employed to represent both units of labor and units of material, and these move forward, as the work is done, toward the central office or to the desk of the cost clerk, affording at once a complete exhibit of the results obtained for every dollar expended both in material and labor, and the opportunity to classify and arrange the records so as to show in a remarkably satisfactory manner almost every phase of the work that can be suggested. The net results of a given department, the relative cost of the same work at the hands of different mechanics, as well as the actual cost of any and every piece of work produced, analyzed to the last degrees, and many other equally desirable statistics, are secured. The lecturer referred to sewing machines and stoves by way of practical illustrations, and, while some of his examples were drawn from arsenal practice, he very happily avoided the technicalities of the service, so as to make his effort, so far as it extended, a far better exposition of his system, at least for average business men and accountants, than is contained in his book on this subject which was published some time since. It may serve as an introduction to that work, and will no doubt interest many in the volume who otherwise would never attempt an investigation of the plan. The speaker made frequent reference to blackboard illustrations, a number of which were provided, and, in addition, had distributed among his hearers samples of each of the tickets and cards employed in the system.

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DURING the past few years development of the various projects of distributing power from central stations has been unusually rapid, and experience has proved, very conclusively in some cases, that notwithstanding the heavy cost of construction and the expense of maintenance of such plants there is still a fair margin for profit. Steam and hydraulic power systems afford familiar examples of what can be done in this line of enterprise, and their success has in a great measure encouraged the undertaking of other work involving the same general principles. Thus in England the idea of supplying compressed air on a large scale for power purposes has at last taken practical shape, and after many efforts the Birmingham Compressed Air Power Co. have been launched. The project is the first of its kind, although in a modified form it has been repeatedly carried out, and the arrangements for supplying the power, which, according to available accounts, are proceeding satisfactorily, will therefore be watched with much interest. The advantages which the scheme offers will immediately suggest themselves, especially where power is required for domestic service, and the fact that they are appreciated is well shown by the number of applications for supply—amounting to nearly 4000 horse-power—which the company have already received.

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WHILE the scheme has received a liberal amount of newspaper advertising, and some of the details have been made public from time to time, it is not without interest to briefly note the more recent developments. The contracts which have now been placed by the company provide for the erection of buildings and machinery and the laying down of mains for a supply of 6000 indicated horse-power, and are to be completed within a year. The ground to be first built upon was laid out for works capable of 15,000 horse-power, but at present only a section will be undertaken. The compressing engines will be in six sets, each set of 1000 indicated horse-power. They will be vertical triple-expansion condensing engines, and will work directly six single-acting air cylinders. Each set of engines and air cylinders will be capable of delivering 2000 cubic feet of air per minute at a pressure of 45 pounds. Nineteen water-tube boilers working at 160 pounds pressure

will furnish the compressing power and will be fired by gas generated in 12 Wilson producers. The wrought-iron air mains, of which some 8 miles of 2 foot diameter will at once be put down, will be laid in permanent concrete troughs and arranged so as to be easily accessible for examination and repair. The air is to be supplied to consumers by meter. It has been suggested that an interesting and very useful development of the project is possible if the power be applied to the generation of electricity for private and other lighting installations, and, as the advantages of such an application are manifest, they will very probably be submitted to practical test. Taken as a whole the scheme presents many points which have hitherto been made subjects of comparatively little experimental investigation, and which may be studied with profitable results. The working conditions are in many respects novel, and will afford ample opportunity for the exercise of good judgment and original design.

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IT WILL be generally conceded that wherever machinery can be made to take the place of hand labor the work will be done in a more accurate and satisfactory manner. Particularly is this true in that division of labor where the proper performance of duties necessitates incorruptibility and entire impartiality, such, for instance, as in the case of a watchman or time taker. Because of the accidental errors, as well as the errors of a preventable nature, which experience has shown will frequently creep into the records of overseers, automatic devices for checking time and for registering work are becoming more and more generally adopted. One of the earlier and most widely known of these devices was for keeping account in guarded buildings of the rounds of the watchman, who at certain intervals had to record his presence in different places. The first machines for doing this were very simple, but as their usefulness was recognized it was discovered that the same principles might be applied to work of a more complex character. Among other outcomes of invention in this direction are apparatus for automatically checking workmen's time. A device of this nature which appears to possess some features of considerable interest has been brought out by Llewellin's Machine Co., of Bristol, England, under the name of Llewellin's patent time-checking machine. The general principle embodied in the invention is that of an accurate clock which regulates automatically the position of various receptacles corresponding to different periods of the day. The workman on entering the shop drops his check into a small hopper, and, if early, it passes into one compartment; if late, into another, the whole arrangement being locked, so as to prevent any manipulation of the mechanism. Each machine is specially adjusted to meet the various regulations, as regards working hours, incidental to the requirements of different trades and firms. The machine is about the size of an ordinary street letter-box, and is surmounted by a clock which controls the operations of the interior mechanism.

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WHEN the workman's time is taken by a gate-keeper there is the constant danger that it may accidentally or purposely be recorded wrong. It not infrequently happens that the workmen, or at least some of them, enter into an arrangement with the gate-keeper, who, in exchange for a certain subsidy, fails to make note of their tardy arrival in the morning. All possibility of this dishonest registering is avoided by placing the whole responsibility upon an accurate-running clock, which, uninfluenced by fear or favor, performs its duties in the most impartial and accurate manner. The Llewellin machine as made is adapted to English regulations, though slight modifications would make it suitable for use in this country. To better explain its action we will briefly describe it as at present manufactured. Before 6 a. m. all the brass or morning checks are hung up on the check-boards. As the operatives pass into work they take from the board their checks and drop them through slits corresponding to the size of the checks into the machine. The checks dropped in at or before 6 a. m. pass into the early compartment. As soon as 6 a. m. is passed the 6.15 a. m. compartment opens, into which the checks drop. There is also a 6.30 a. m. compartment for receiving the checks dropped after 6.15 a. m. The next receptacle brought into position is the one marked 8.55 a. m., which receives the checks of the workmen on returning from breakfast. The breakfast checks are of zinc, to distinguish them from the set used early in the morning. A third set of copper checks is hung on the board at noon, and on the men returning from dinner the machine separates them according to the time of dropping in the same general manner as was done at the two earlier periods of the day. In the afternoon the door of the machine is unlocked and the tray containing all the checks separated into early and late is withdrawn. All that remains to be done is to make up each workman's time from his checks and enter it in the time-book. Though at first sight the system may appear somewhat complicated, we think it is due more to the fact that it is planned for English shop practices than to any intricacy in the system itself. In this country the working day is divided into but two divisions, and a time-checking machine of the general principle of the one described could in consequence be considerably simplified. As we have before pointed out, the great advantage of such a system is its perfect fairness and impartiality, no tampering with the records being possible except when the entries are made in the time-book at the end of the day, but it is not a difficult matter to get clerical work of this nature faithfully done. It is the aim of all modern shops and factories to have as much of the work done automatically as possible, and the application of the same principle to recording the time of the workmen would seem to offer corresponding advantages.

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SPEAKING about the line of beauty in architecture, R. P. Knight says: "As to lines, I know of none that may not be graceful, elegant and beautiful in proper circumstances and situations, and none that are not the reverse when employed improperly. This just application of them just feeling alone can determine, for those who have attempted to regulate it by system have only set up system against sentiment, and thus co-operated with the caprices of novelty and fashion in diffusing false taste through the world: Zigzag walks, serpentine canals, spiral columns, broken or scooped pediments, have all sprung from this systematic 'line of beauty,' and for some periods triumphed over the common sense and common feelings of mankind. In architecture, indeed, this sacrifice of feeling to system has been less prevalent than in other arts which, being less immediately appropriated to the uses of common life, were less under the influence of common sense; for, though spiral columns and scooped pediments were for a time in fashion, it was more with painters than with architects; and painters, as before observed, have reasons peculiarly belonging to their own art for preferring them. Undulating walls and serpentine balustrades have nowhere that I know of been in use; nor have I seen or heard of curved roofs on this side of China, except in imitations introduced into this country principally by a person (Sir William Chambers, R. A.) who gave equal proofs of the purity of his taste when he censured the temples of Athens and designed those of Kew."

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A WRITER in one of our exchanges deplores the neglect of doors in decorative treatment, which is now such a prominent feature in house designing and furnishing. He says: "There are no articles of furniture in a room more conspicuous than its doors, or more difficult to keep out of sight, excepting, of course, sliding doors that are never closed. We might, indeed, do them up in brown linen wrappers with red tape trimmings, as tidy housekeepers sometimes serve their piano legs when they are too ugly to be exposed, and the chairs, when the upholstery has become faded and shabby, but such a broadside of canvas or cambric would be worse than the native pine. That beautiful designs, rare and elegant materials, should be lavished on chimney-pieces, bookcases, cabinets and other stationary furniture, leaving the doors in the stiff and formal ugliness of common machine-made shopwork, is among the unaccountable inconsistencies of house-building."

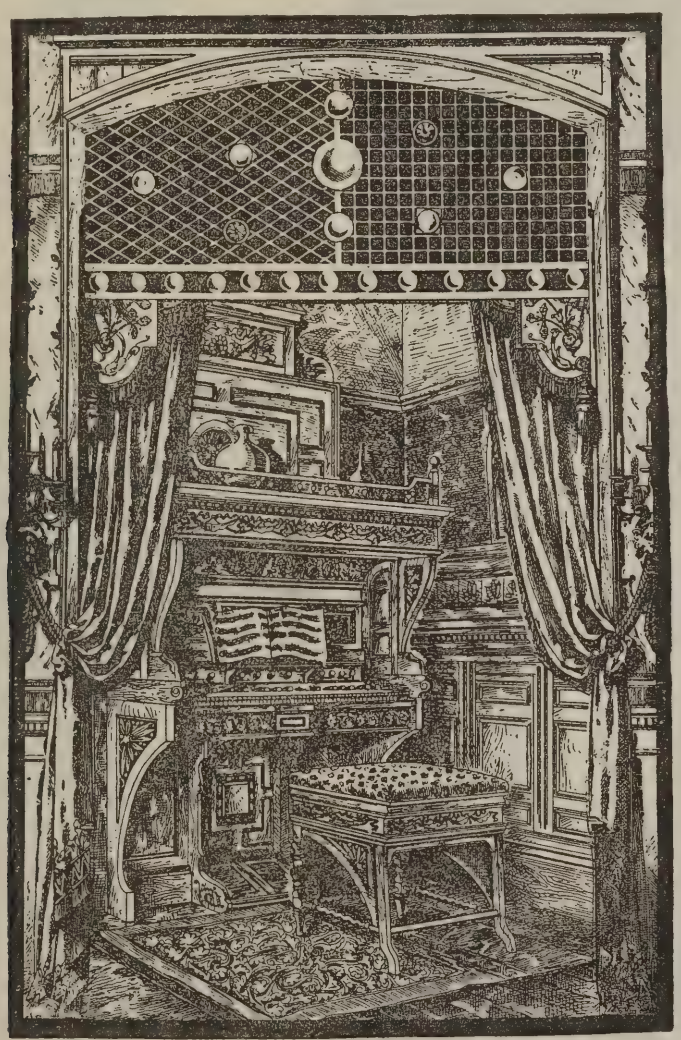
## THE PLATES.

Plates XXV to XXVII are devoted to the perspective view, elevations and floor plans of the second prize design in the seventeenth competition, and are described more in detail in another column.

In Plate XXVIII are some sketches made in the ancient town of Bruges, for which we are indebted to Mr. Walter Aston, of Boston. He has also furnished us with the following notes respecting a visit to that city which he made a short time since, and which in part refer to his sketches:

Passing through the narrow winding streets of Bruges one is struck with the Old World look of everything. There is no hurry, and the streets are half deserted. The worthy citizens go about their respective callings in the easiest manner in the world, and seem in harmony with their surroundings. At every turning there is a picture so quaint that the student is at a loss to choose between the many objects of interest which to sketch first. He finds himself drifting on from place to place, taking a strange delight in these relics of years gone by. Presently he is carried back to the sixteenth century. The houses have much the same air, and many of them may belong to that period. Here is a group of women, with children playing around, seated in an open doorway, and through the opening is the quaintest interior shaded in darkness. The costumes are picturesque, and the children clatter in their sabots on the rough stone pavement. The women are making lace, and as they work they sing and beat time with the spindles. His curiosity may prompt him to examine the work, and judge of his surprise in finding an exquisite early Gothic design, centuries old, so perfect in every detail, handed down from mother to daughter as a precious art. Passing on, at the corner of the street is a tiny shrine with a lantern hanging before it to light up the patron saint above, and a woman devoutly crosses herself as she goes by. Then more winding streets, odd-looking Flemish gables, built of brick and mellowed with time till they take all the delicate tints of brown and red and catch the bright sunbeams up above. Wrought-iron signs swing far over the street. Here is a knocker still in use—it must surely be centuries since it was fashioned. Now he speaks to a Sister of Mercy attached to the Hospital of St.

John, and she wonderingly asks if London can really be as big as Bruges. Then there are the canals, shaded with funny clipped and distorted trees everywhere. The cathedral must be entered, and the pictures and sculpture are attractive; the Palace of Justice, with its famous chimney-piece, and the fascinating semi-Moorish church hard by. There is a broad ditch around the city, with here and there an ancient gateway, and standing out against the sky are some hoary windmills. The sails glide round as though they, too, had caught the spirit with the rest, and were too infirm to hurry. Back again past more canals and pictures. The beggars crowd around. Then the bells ring forth a merry tune from the clock-tower in the great square. What a tower and what a view to repay the climb. Then back to the Golden Bear. The landlady takes sly peeps through a mysterious hole in the wall, to see how the wandering artist fares, and the old retired merchants stroll in to discuss to things in general, and their long pipes and glasses of wine in particular.



*Japanese Lattice-Work.—Fig. 1.—A Clever Device for Covering an Angle.*

## "Cui Bono's" Design.

The design by "Cui Bono," (D. B. Provoost, Elizabeth, N. J.), which we published in our May issue, represents a house, many duplicates of which, with minor modifications, have been built in and around Elizabeth, N. J. The design, we learn, has become very popular, and in its present condition is the result of long study and many modifications made in the light of experience. A brief epitome of the specifications usually supplied with this design was submitted by the author. From these specifications we glean the following: The foundation is to be 12 inches thick, of brick. The cellar bottom is to be cemented 4 inches in thickness. Bluestone is to be used in the window-sills and cellar steps. The frame of the building throughout is to be of spruce, with 4 x 10 inch sills, 4 x 8 inch posts, 4 x 6 inch ties and plates, and 2 x 8 inch rafters, all framed and pinned together. The building is to be first sheeted with diagonally worked pine boards, over which rosin-sized paper is to be placed. The first story is to be covered with narrow beveled pine siding, and the second story with 5 x 16 inch clear white-pine shingles. The roofs are to be shingled with 18-inch sawed pine shingles. The floors are to be laid with 1 x 5 inch white-pine flooring. The stairs are to be of ash. The kitchen is to be wainscoted 4 feet high in white pine. The sink finish, including casings and inclosure, are to be of ash. The bathroom is to be provided with a Sanitary closet and 6-foot copper bathtub, 16-ounce, and marble-top washstand. The wainscoting and general fitting in the bathroom to be of ash. The first-story doors are to have three panels each; the second and third story, four panels each. All passage doors to have 3½-inch mortise locks, and closet doors to be provided with a reverse beveled rim lock. All doors to be fitted with porcelain knobs and plated furniture. All sash to be 1½ inches thick, hung with cords and weights and fastened with Niles' sash locks. The first and second story windows in the main house are to have paneled backs. The specification closes with the sweeping clause that the house is to be built in a good and substantial manner in all its parts, and all materials to be of a good quality of their several kinds. The estimate on a house of this design now in process of construction is summarized as follows:

| | |
|---|---|
| Carpenter-work | $4,240 |
| Mason-work | 1,200 |
| Plumbing-work | 450 |
| Painting | 300 |
| Total cost | $6,190 |

## Japanese Lattice-Work.

Our attention has recently been called to a line of lattice or fret work bearing a foreign name, but manufactured in this country, in which we think our readers will feel an interest. Illustrations of the application of the work are presented upon this and the following pages. It is not difficult to account for what may be said to have assumed the proportions of a decorative craze in this work. Japanese lattice-work, while odd, is at the same time very ornamental and withal exceedingly useful. The cunning Japanese have long recognized this fact. For many years they have employed work of this character to stiffen their rice-paper windows, and in this use it is probable that it originated. Large quantities of it have been imported for use in this country, but the Japanese work has been practically pushed out of the market, by American skill and enterprise, and what was at first looked upon as a somewhat impudent imitation is now considered by many competent judges to be superior in many respects to the original. The designs which we represent herewith are from a catalogue recently issued by Cutting & Delaney, of 194 Washington street, Buffalo, N. Y. They represent some of the applications of the work of this kind which they are manufacturing. We have examined specimens of the work and can bear witness to the fine workmanship and the artistic nature of the designs and the exquisitly fine combination of parts which is revealed on every hand. This firm are not only reproducing all the

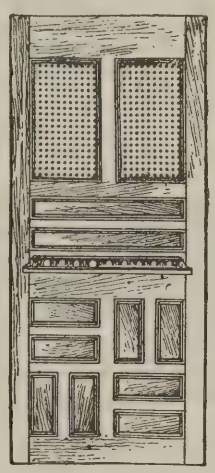


*Fig. 2.—Door with Fretwork Panels Backed with Silk.*

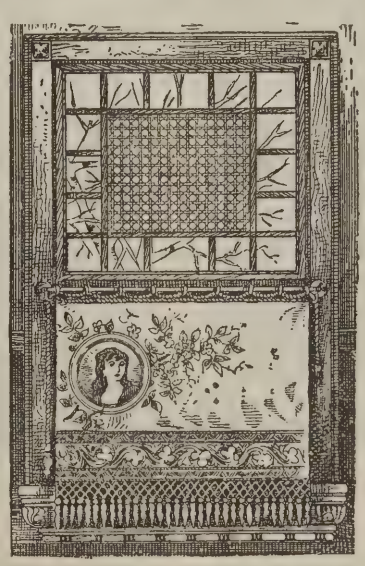
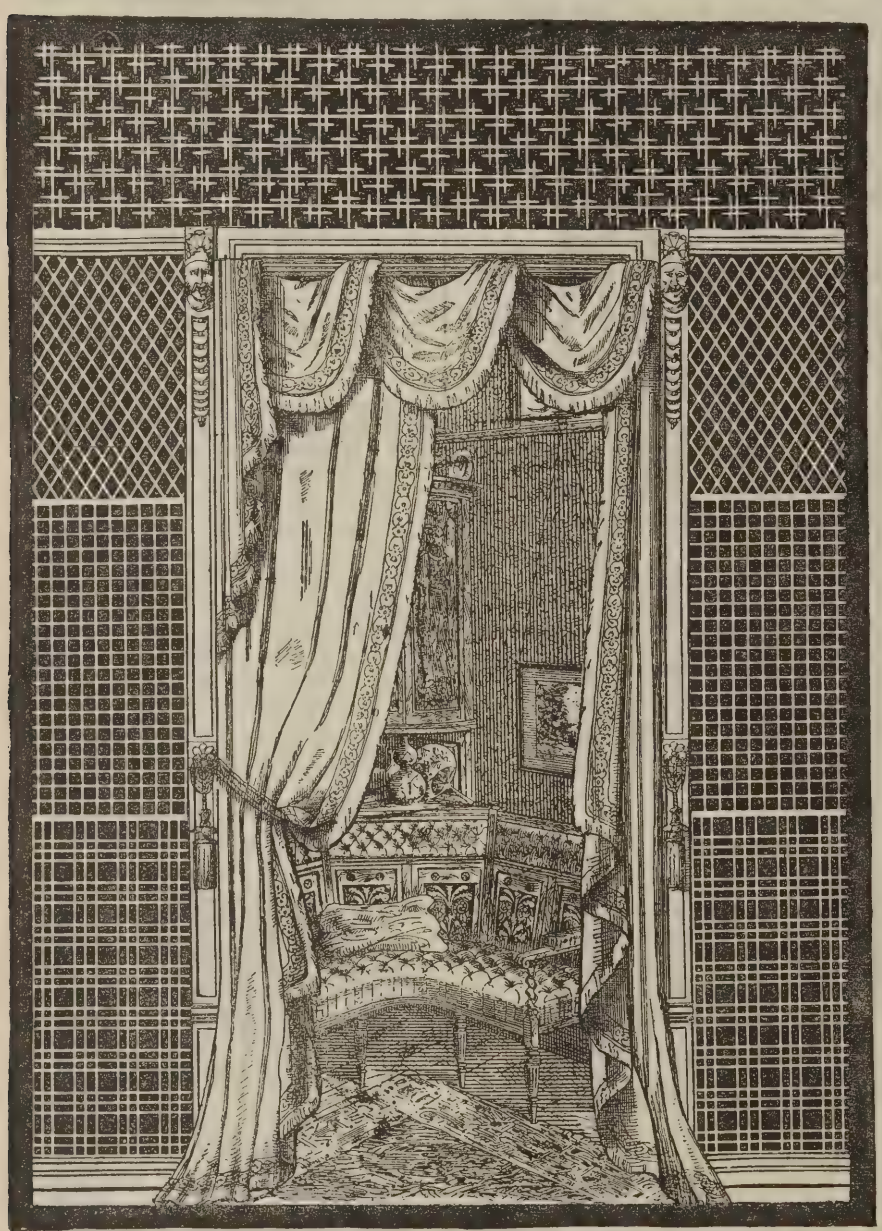


*Fig. 3.—Window.—Center Panel in Upper Half Has Plain Glass with Fretwork Backed with Silk.*

designs in Japanese lattice and fret work, hitherto peculiar to the Japanese artisans, but they have gone further and suggested many new patterns and combinations, and have suggested new applications of the work. Refering to the illustrations, which represent work which has actually been done, Fig. 1 shows how the angle of a room can be cleverly and artistically covered with jeweled, turned, and fret work so as to add attractiveness to an appartment. Fig. 2 shows a method of paneling doors with fretwork, backed with silk, with artistic effect. In Fig. 3 is shown a stained glass window, the lower part of which is covered with a silk screen. The peculiar feature to which attention is directed is the central panel in the upper half, which is fitted with plain glass and covered with fretwork backed with silk. Fig. 4 shows a method of reducing an opening which at the same time admits of the employment of drapery and shows how different patterns of latticework may be introduced. A bamboo cabinet trimmed in real bamboo is shown in Fig. 5. The design is quite simple in its parts, but as a whole is exceedingly effective. Any carpenter can make the body of such a cabinet, and the face can readily be edged with split bamboo. The panels can be lined with Japanese matting. A lattice door completes a cheap, but very ornamental, piece of furniture. The application of this kind of work to a ceiling finish is illustrated in Fig. 6. The panels around the border employ various patterns, some with and some without jewels. They are backed with silk of different colors to suit the taste. The jewels are made additionally effective by backing them with tinfoil. The center of the ceiling is filled in with poplin, silk, muslin or chintz, the whole forming a combination that is appropriate for the purpose and in keeping with modern art taste. Fig. 7 shows this style of lattice-work with jewels employed in a door transom.

Messrs. Cutting & Delaney inform us that they have spent much time and a large sum of money in perfecting this work, which, as the reader will understand, is very intricate and necessitates very skillful handling. The slats composing the design are halved together and joined with glue. The jewels are placed in special settings, and have their appropriate position in the lattice-work. Special machinery is said to be used for each design, and the various pieces of the lattice are put together by girls, whose nimble fingers soon render them exceedingly expert at the work. The wood employed is chiefly white bass and oak worked up in antique shades. Black walnut is extensively used for dark effects. In finishing, it may be remarked, the work is too delicate to go beyond a stain. Varnish cannot be used.



*Japanese Lattice-Work.—Fig. 4.—Design Illustrating How an Opening May be Reduced and at the Same Time Admit of Suitable Drapery.*

We learn that a company has been organized at Columbus, Ohio, for the manufacture of brick and ornamental work from shale. This material has heretofore been used to some extent in the production of fire-brick; but it is claimed that recent inventions have made it possible to utilize it for all purposes in which ordinary clay brick are now used, and to produce it at a price far below that at which brick of the present manufacture can be afforded. In color it is gray or grayish black, or brownish red when containing much iron. It is claimed for it that it is very handsome, and its enduring qualities are pronounced unequaled by anything now in use as a building material.

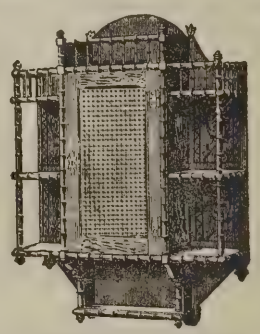


*Fig. 5.—Bamboo Cabinet with Japanese Panel.*

## Seventeenth Competition.

In the last issue the Editor stated that a number of the contestants in the Seventeenth Competition had requested criticisms upon their drawings. We also mentioned that the Committee of Award had passed these requests by without attention, and accordingly the entire responsibility of criticism fell upon us. We promised at some future time to give the subject attention. This obligation we shall endeavor to discharge at the present time. In doing so we shall offer a few remarks on such plans as attract particular attention, including a number of studies concerning which no special request has been made. We offer these criticisms in the most friendly spirit, and we would not take the trouble to publish them if we did not believe that they will be of benefit to the several authors, as well as to draftsmen at large. It will be impossible in the space at our command to give attention to the entire number of studies, and for the purpose of making the number to be mentioned as small as possible we shall at the outset omit those of which honorable mention has been made. Among the others those which are neither very good nor very bad will likewise in many instances escape attention.

The conditions named in this contest stated something about the studies to be submitted being suitable for publication in *Carpentry and Building*. Emphasis was placed upon the requirement that the designs in their general character and details should be adapted to erection under average conditions. It is not surprising, therefore, that the Committee of Award passed by drawings showing desirable elevations, excellent floor plans, and containing many features to recommend them for erection, simply because there were few or no details, or because the specifications were lacking in many essential particulars. For example, "Endeavor" (No. 29) presented for details a section through the water-table, a section through the main cornice and a section through the roof of an overhanging gable. This was the extent of his details, and what was given might have referred to any other house as well as the one with which they were submitted. The specification was written on the sheet of drawings, and was comprised in 12 lines, and contained exactly 84 words.

The same remarks, with a modification so far as concerns the specification, apply to the study submitted by "Haste" (No. 36). His elevations and floor plans contain many desirable features. The details, however, show nothing that any carpenter would care about or would need to have so far as assistance in doing the work is concerned. His specifications, however, were better

than those above referred to, and there was included an estimate of cost,

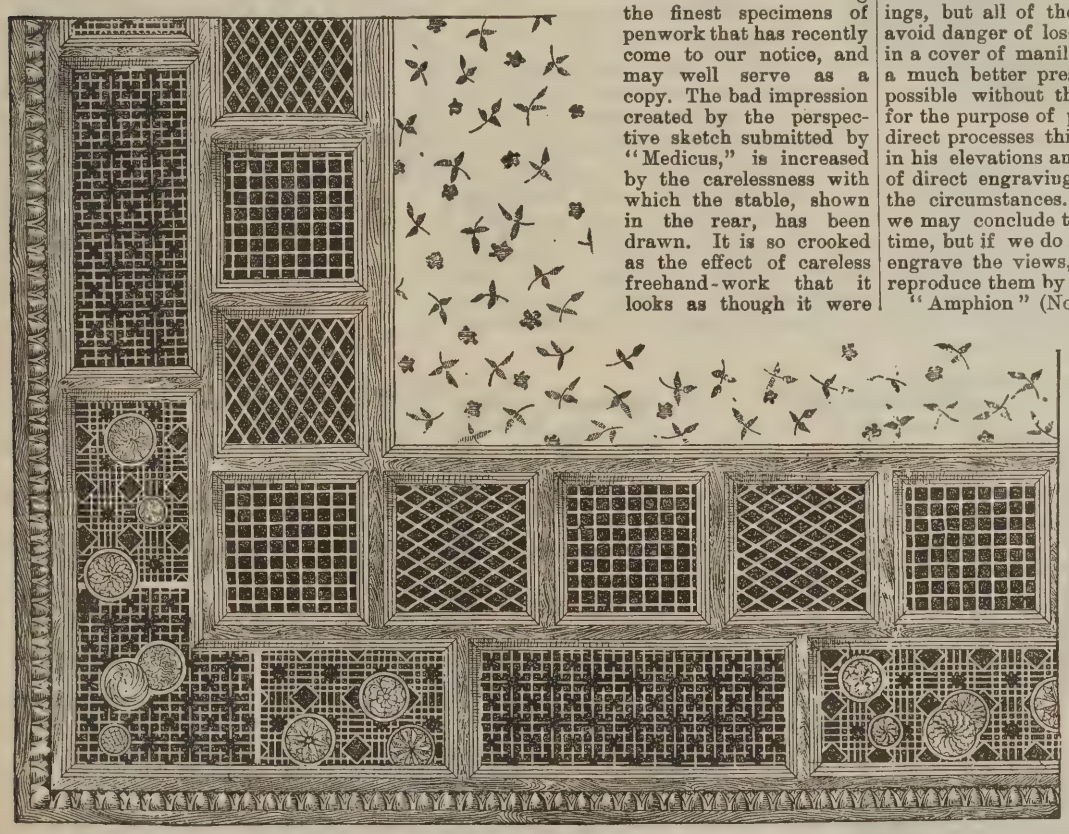
We wonder what architects must be thinking of when they prepare a study including plans and elevations on small bits of paper. "O. M. Z." (No. 37) sent his effort on no less than 10 pieces of paper, the largest of which is a little more than 1 foot square and the smallest of which is about 6 inches square. Uniformity in size is lacking. If a builder were to receive such drawings and were by accident to loose a sheet, as he would be very likely to do, we are of the opinion that the architect would be more to blame than the builder.

These remarks apply in part also to "Te Judice" (No. 18), who as a draftsman ranks higher than the author whom we have just critised. His perspective is on a piece of bristol board, cut to the ends of the picture. Any one who gives the subject any reflection will be convinced that a picture, whatever its quality, will be improved by giving it adequate margin. This idea was acted upon by a number of competitors, to the manifest advantage of their design, and this author would have done better by being less economical. The remainder of "Te Judice" drawings are comprised in 18 separate and distinct pieces. The floor plans are very handsomely worked out, and in many respects the design is deserving of better presentation than it received. The large number of pieces of paper occurs from the fact that various details, such as, for example, the hip gable, second-floor doors, vestibule door, inside doors first-floor, chimney, &c., are each on a separate piece. The specification in this instance has been carefully prepared, but has a defect which we may mention once for all; it is written upon both sides of the paper, something which is very objectionable from the printer's standpoint and also in many cases the business man's standpoint as well. Paper is too cheap nowadays to warrant using it sparingly where a point is to be made by employing it liberally. Whatever there is to write or print descriptive of a building is best written upon one side of the paper only, and mistakes are less liable to occur in matter submitted in this way, whether for publication or as a basis of contract, than when written or printed upon both sides.

"Nemo" (No. 1) is another genius who believes in a multitude of pieces of paper. The remarks which appear above, save only that his specification and estimate were written on one side of the paper, apply to this study.

"Castle in the Air" (No. 62) submitted a study the drawings of which deserve special mention, although in the estimation of the committee they were not worthy of a prize. The different views are drawn upon a quality of drawing paper not commonly encountered in such studies. It resembles bond paper, and the lines stand out very clearly, and the work is very neatly done. The details are almost as meager as some of those we have referred to above, and notwithstanding the fact that this competitor offered to furnish additional matter, together with a specification in case the drawings were desired for publication, the committee passed him by. We wonder if it ever occurred to this contestant or to others who are in the same position that a decision in a competition is necessarily made in the light of the exhibit offered, and not in view of what may be done at some future time upon request. We venture the opinion that, had "Castle in the Air" finished his study throughout as carefully as he did the work he sent in, the result would have been different in his case from what it is.

"Medicus" (No. 72) submitted a study which had some features to recommend it. The perspective sketch is effective in part, but is spoiled by cross-hatching and a general indistinctness produced by too much freehand-work. A little more care in drawing lines would be useful to this designer. We commend to his attention the perspective view of Pohl & Simonson, published in our June issue. It is among the finest specimens of penwork that has recently come to our notice, and may well serve as a copy. The bad impression created by the perspective sketch submitted by "Medicus," is increased by the carelessness with which the stable, shown in the rear, has been drawn. It is so crooked as the effect of careless freehand-work that it looks as though it were about to tumble down or had been badly twisted by a cyclone.



*Japanese Lattice-Work.—Fig. 6.—Ceiling Finish Composed of Different Patterns of Lattice-Work with and without Jewels and Backed by Silk of Different Colors.*

One of the neatest specimens of draftsmanship submitted in this contest was that by "Kalorama" (No. 73). The drawings reached us in the form of tracings, the lines of which are exquisitely fine, and the contrast between light and dark of which has been done with unusual care. The details so far as presented are worked out with equal fidelity, but there are very few of them, and without venturing to speak for the Committee of Award we presume for this reason this study was passed by in favor of others which more nearly approach the standard of *Carpentry and Building*. The specification and estimate submitted by this contestant were worked out with great care, and are of a character to be considered excellent copy from the printer's standpoint.

Comparatively few of the competitors seemed to recognize the advantage of having all of their sheets of drawings of the same size. "Bull's Eye" (No. 32) sent in a study of perhaps average merit among those not receiving an award, in which four sizes of paper are used. Three different sizes are employed among three elevations and a perspective. Irrespective of the actual quality of the design and the draftsmenship this study would have made a better impression had the author been more careful in these particulars.

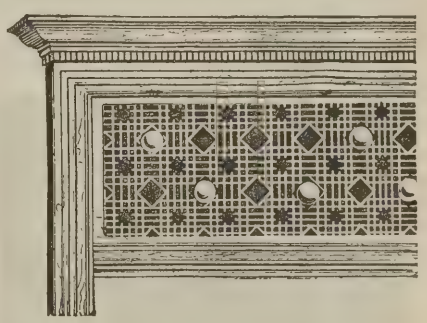


*Fig. 7.—Lattice-Work with Jewels in a Door Transom.*

"Devonia" (No. 25) employs different sizes of sheets on which to make his drawings, but all of them are large enough to avoid danger of loss. He secures his sheets in a cover of manila paper, and thus makes a much better presentation than would be possible without this care. Unfortunately for the purpose of publication by any of the direct processes this author has used colors in his elevations and plans. Nothing short of direct engraving would be possible under the circumstances. This study is one that we may conclude to publish at some future time, but if we do so we shall be obliged to engrave the views, since it is impossible to reproduce them by photo-lithography.

"Amphion" (No. 55) presents two large sheets of drawings of details, tied with red tape to still larger sheets of manila paper. His elevations and plans are on bristol board, the sheets being comparatively small, and but one subject appearing on a sheet. There is lack of uniformity in these efforts, and some of them are trimmed in a way to suggest "cheese-paring" economy on the part of the author. The detail drawings are on sheets too large to spread conveniently on a desk or such a table as the average builder would find available when making an estimate. The specification is on one size paper and the estimate on another. Altogether there is a greater variety of sizes in the make-up of this study than it is to the advantage of any one to employ. Such matters, while they do not affect the quality of the work, go far toward creating impressions concerning it.

(To be continued.)

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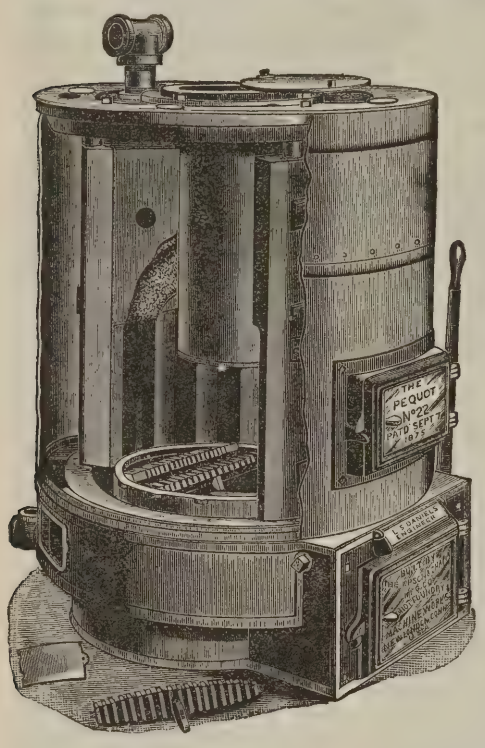
One of our exchanges presents the following recipe for softening putty that has become hard by exposure, for the purpose of removing it from the sash: Take 1 pound of pearlash, and 3 pounds of quickstone lime; slack the lime in water, then add the pearlash, and make the whole about the

consistency of paint. Apply it to the putty on both sides of the glass, and let it remain for 12 hours, when the putty will be so softened that the glass may be taken out of the frame with the greatest facility.

## Heating by Hot-Water Circulation.

The subject of warming dwellings, offices, &c., by the circulation of hot water is attracting so much attention in this country at present that a full description of some of the apparatus that is being used for the purpose cannot fail of interest for our readers. We present the details of one form of boiler that is being used upon this plan, together with the radiators and radiator screen.




*The Pequot Hot-Water Circulating Boiler.—Fig. 1.—Sectional Perspective View.*

The Hopson & Chapin M'f'g. Co., New London, Conn., have recently put on the market the Pequot Hot-Water Circulating Boiler, sectional views of which are shown in Figs. 1 to 5 of the accompanying cuts. This heater is recommended for residences, offices and all buildings where it is desirable to maintain an equable temperature during cold weather. The system of hot-water circulation embodied in this heater is that of low temperature or without pressure, the highest point being open to the atmosphere. The boiler is placed at the lowest point, and all pipes leading from it to radiators are at an incline upward to and downward from them. The pipes and radiators on all floors are filled as well as the boiler with water. A tank on the pipe at the highest point permits the ordinary expansion of the water without overflow. The temperature of the water in the boiler being raised above that contained elsewhere it rises through the pipes to the radiators, and parting with its heat returns again to the bottom of the boiler. In Fig. 1 a perspective view showing the interior parts of the heater is presented, from which a general idea of its arrangement and appearance can be obtained. In Fig. 2 a sectional view through the boiler is given. It will be noticed that the boiler proper is suspended on the ring K, on which the lower ends of the sections rest. There being no flange or rust joints or bolts, the section heads and nipples are perfectly free to expand or contract without loosening any joints or bringing any undue strain on any of the parts. The fire, which is base burning, is fed from the magazine C, the cover A being removable when coal is to be added. By referring to Fig. 4, which shows a cross-section of the boiler, and comparing it with Fig. 3, the shape and arrangement of the boiler sections will be understood. The sections indicated by G in the engravings are of cast iron, are arranged radially about the magazine and present a very large heating surface. The lower part of the section, the shape of which is shown in Fig. 5, is narrower to allow room for the grate and fire. The sections being vertical the water rises freely as it becomes heated and gives a rapid circulation. Another advantage of this construction is that dust and dirt cannot lodge on the sections and interfere with the economical working of the boiler.

Another sectional view of the apparatus, made at right angles to the one shown in Fig. 2, is presented in Fig. 3. Here the fire-door and draft passages are shown, there being a revertible flue at the back for changing the direction and thus altering the force of draft. The boiler sections G are connected at the top by nipples with the annular water drum on top header E, and at the bottom with a similar drum, M. By this means a circulation is kept up through all parts of the boiler, and does not allow any one section to become overheated. From the top header the pipe S carries the heated water to the radiators wherever placed, the water as it cools returning to the boiler at the bottom through the pipe, thus establishing circulation throughout the entire heating system. Fig. 6 shows a top view of the boiler, R being hand-holes through which entrance is gained to the space between the boiler and its setting for cleaning. The rocking grate-bars, different views of which are shown in Figs. 2, 3 and 5, are connected with the rocker-arm situated at the right in Fig. 1. The Pequot Direct Radiator, Fig. 7, may be built to any size by simply adding on the sections shown in Fig. 8. The radiator sections are of cast iron, with broad horizontal flanges for increasing the radiating surface. The pin

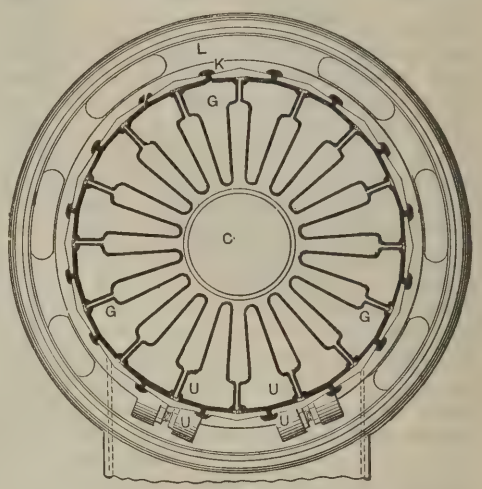



*Fig. 4—Horizontal Section Through Boiler.*

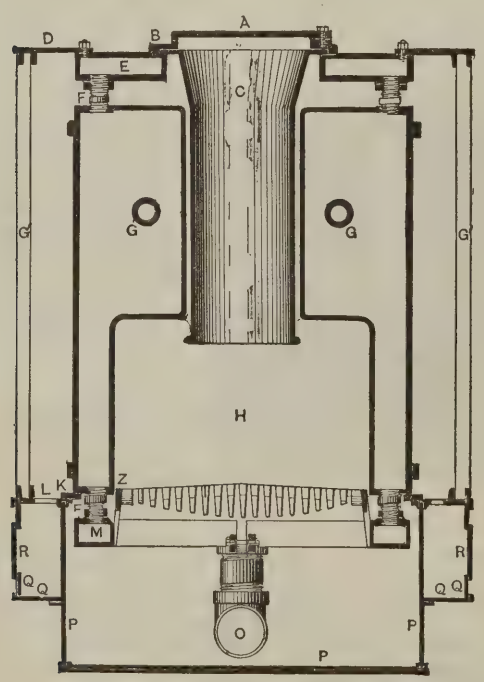



*Fig. 2.—Vertical Section Through Boiler.*

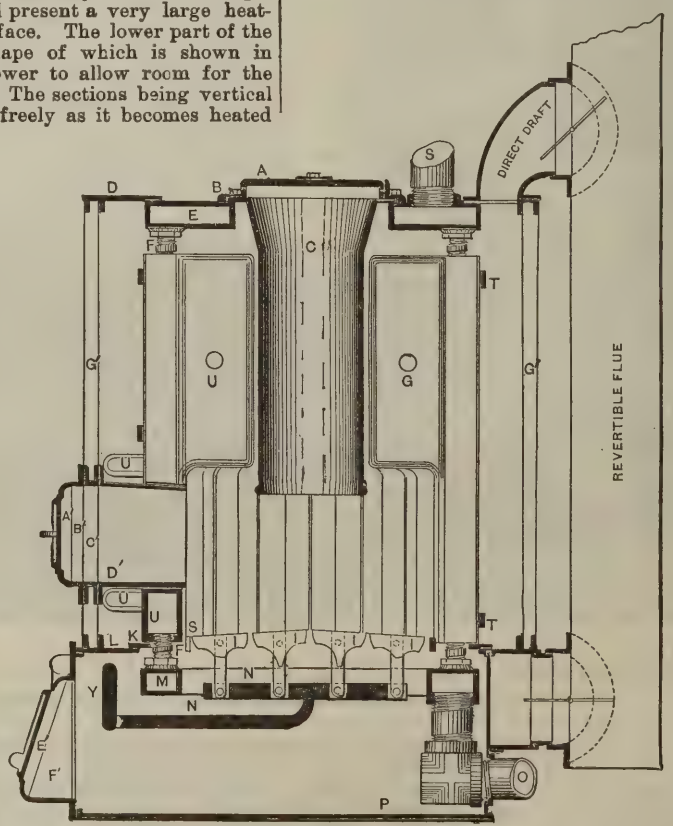
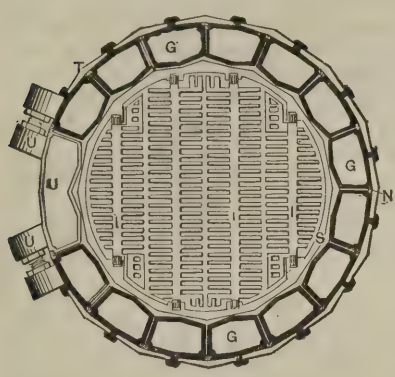



*Fig. 3.—Vertical Section, Showing Flue.*

radiator, Fig. 10, which is so widely used in steam heating, is employed in connection with the Pequot boiler where the heating is done by the indirect plan. Fig. 9 presents a perspective view of a wrought-iron ra-




*The Pequot Hot-Water Circulating Boiler.—Fig. 5.—Horizontal Section at Grate.*

diator screen of artistic design made by the Hopson & Chapin Mfg. Co., which is an efficient guard against contact with the radiator, while at the same time it does not lessen the heating power. In a circular issued by the company the greater advantages of hot-water heating as compared with steam heating are referred to at considerable length.

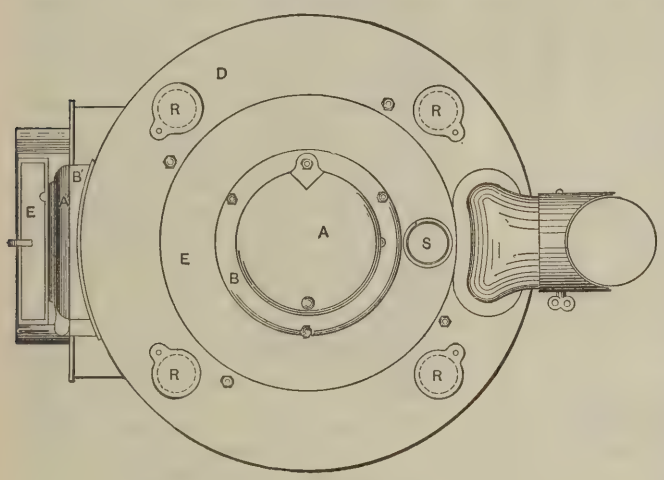



*Fig. 6.—Top View.*

A very elaborate public library building will soon be erected in Boston. The location is on Dartmouth street, opposite Copeley square. The interior plans at last advices were completed, and the building, if erected as at present contemplated, will add to the already long list of notable buildings which adorn the vicinity named.

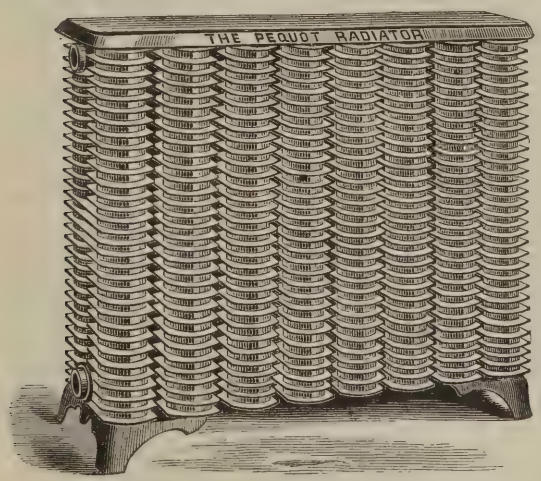



*Fig. 7.—General View of Radiator.*

## History of the Modern House.

(Concluded from page 110, March issue.)

One of the first steps in the volution of a rough wooden Saxon house in its course to become a dwelling of the nineteenth century was the adoption of a chimney and fireplace. The chimney in its present sense of a funnel from the hearth or fireplace is a comparatively modern invention. Greek houses, it is supposed, were without chimneys, the smoke escaping through an aperture in the roof; but the arrangement in houses with an upper story is not known; possibly the smoke was conveyed through a short funnel through the side wall, which seems to have been the first form of chimney in the Middle Ages. It is not known whether the Romans had any artificial way of carrying off the smoke, or whether it escaped through the doors and windows and openings in the roof. We look in vain among the Saxon drawings for any trace of a chimney. That useful invention appears to have been then unknown, and a simple aperture through the roof to let the smoke escape did duty for it. It is probable that the convenience of chimneys was not generally enjoyed in Europe till the fifteenth century. At any rate there was more in the civilized city of Rome in the previous century; for in 1368 a prince of Padua, on making a journey to Rome, took with him masons, who constructed a chimney at the inn at which he stayed, "because in the city of Rome they did not then use chimneys, and all lighted the fire in the middle of the house on the floor." If, on the contrary, some existing remains in ancient castles seem to prove that perpendicular flues were occasionally made in such buildings during the twelfth century, at any rate it is certain that they were not in general use at such an early period. Certainly it may be granted that contrivances which might be considered chimneys were in use, but not chimney shafts. For example, in Rochester Castle (*temp.* about 1130) there are complete fireplaces, but the flues go only a few feet up in the thickness of the wall, and are then turned out through small oblong holes. The earliest chimney shafts are circular and of considerable hight. Those of a later date are in a great variety of forms. The early fireplace appears to have been merely a flat stone let in the middle of the floor of the apartment, upon which the brushwood was ignited, and the logs, which formed the usual fuel, burned. Subsequently wrought-iron supports, or fire-dogs, were added to support the logs. When chimneys were added, the fireplaces necessarily retreated to the wall, and with the more or less rapid adoption of coal as fuel, during the Tudor period, the fire-dogs or andirons, had to give place to grates.

The date of the origin of stairs is not certain. There is but little doubt that in England the means of access to the lofts or other upper sleeping places was by a fixed ladder outside, such as may be seen outside and up to the top floor of a granary in our agricultural districts. In castles or monasteries doubt less stone stairs existed from an early period; but some of the Saxon manuscripts would give us the notion that regularly formed wooden staircases (of course, external) were in use before the Norman Conquest. The word "stair" comes from the Anglo-Saxon "*stæger*," which simply bore the sense of a "footway" or "footpath." Another important part of the household economy did not exist in the ancient English house; we allude to the window, and, of course, mean the glazed window. Mere apertures to admit light and air must be pleasant, even in a cabin. Glass

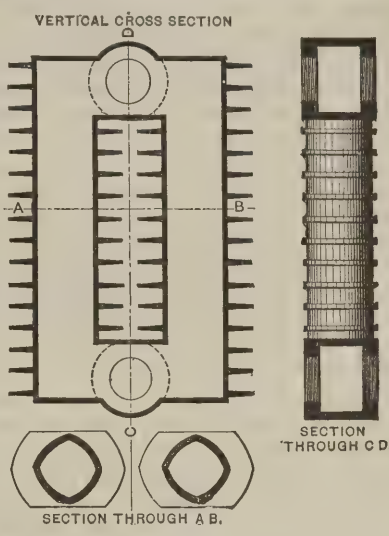



*Fig. 8.—Detail Views of Radiator Section.*

appears to have been known to several of the ancient nations, more particularly to the Romans, but was not used for the purpose of glazing, although horn was, and a few glass panes have been found in the ruins of Herculaneum, which city was destroyed by the eruption of Vesuvius in A. D. 79. Stained glass for

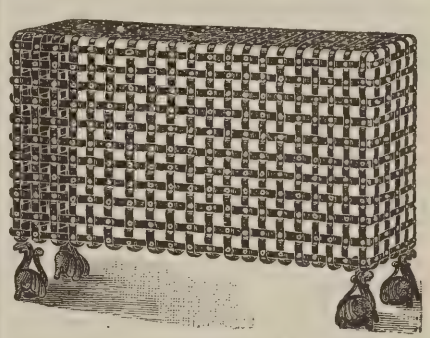


*Fig. 9.—Radiator Screen.*

ecclesiastical edifices was no doubt used in England at a very early date. Its first introducer is said to have been St. Biscop Baducing, a monk, who filled the windows of the parish church of St. Peter, at Monk Wearmouth, with stained glass. But then the churchmen of that period could command much more wealth than an ordinary

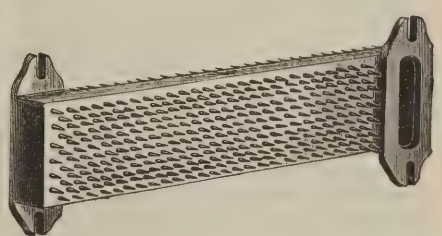


*Fig. 10.—General View of Pin Radiator.*

nobleman—nay, often more than was at the disposal of a scion of a princely house. But, although there are in this country many specimens of the painted glass of the twelfth century, that material is not mentioned for ordinary glazing purposes in any document of so early a date hitherto discovered. It seems probable that it was originally confined to ecclesiastical buildings, and that windows in houses were simply closed by wooden shutters, iron stanchions being sometimes introduced for greater safety. It would appear that canvas or a similar ma-

terial was occasionally used for glass in early times, and especially in churches, before stained glass was introduced. The glass of the early windows was set in lead, and these are termed "lead lights." The invention of wooden sashes was very much later.

The water supply in the Early Middle Ages seem to have been very poorly seen to. If any river, brook, spring or pond was in the vicinity, that was considered a reservoir amply sufficient. Later on primitive forms of pumps came into pretty general use. The art of supplying water by aqueducts and pipes, although practiced by some ancient nations, does not appear to have been known in England until the sixteenth century. Of course in those early days there was but little attention paid to the sanitary condition of the dwelling. In fact, sanitation may be considered altogether a modern science. The necessity of ventilation was not thought of in the old days. Drainage was equally neglected. For cloacal conveniences they had the old privies detached from the house, and requiring to be emptied periodically by night men, and the soil spread over the land. Water-closets were late in their introduction into England, and yet both the principle and the practice of them are ancient enough. They were certainly known to the ancient Romans. The water-closets of the palace of the Cæsars were adorned with marble arabesques and mosaics. At the back is a cistern, with faucets for the different seats. The pipe and basin of one still remain near the theater of Pompeii. Sir John Harrington, in the time of Elizabeth, introduced them into England.

## Painting Floors.

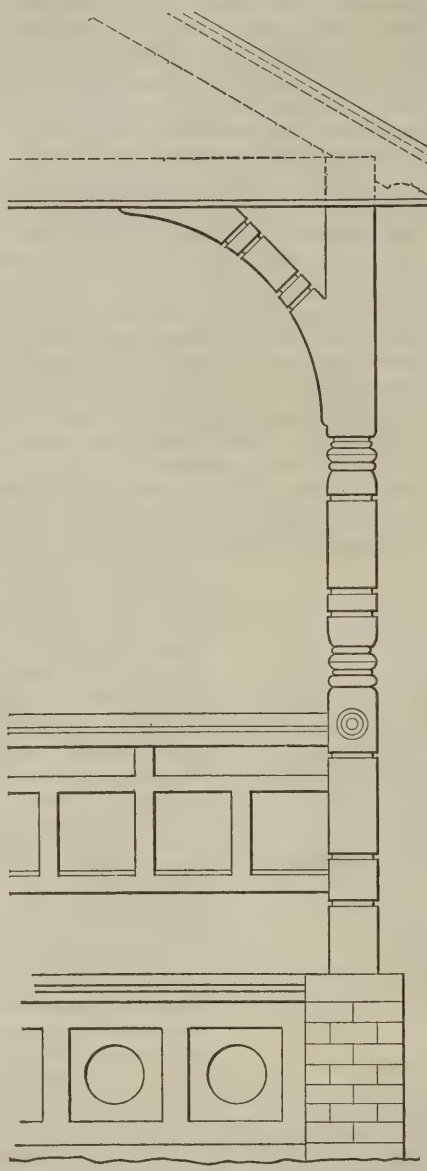
The following directions for floor painting were given a short time since in the *Painters' Magazine:*

Now that the fashion is more and more prevalent of using carpets that do not completely cover the area of the floor, and which thus escape distortion by being so cut as to coincide with every angle, recess or curve of the walls, floor painting should certainly be more generally adopted. Painted borders are all well enough, but the whole area of the floor may be advantageously laid out in color. This painting necessarily involves priming, which in itself, as applied to floors, is hygienic, as having the effect of closing the pores in which dust lodges, the dust with its darkening and forbidding effect never failing to obtain lodgment unless indeed the boards should be of costly hardwood, which is the exception, not the rule. It may be said that a floor painted all over will not be seen, but, without replying that a painted border where the whole area is not colored is a deception, we may remark that the entire treatment of a floor or cover affords a security against unsightliness should any portion of the central carpet be accidentally raised, and that in the event of its removal for purposes of cleaning the painted ground suffices, more especially if enriched with a few rugs or tinted or patterned mats.

In the hot summer months a floor artistically painted will be often found preferable to carpet, as aiding in the movement of the air, not harboring dust, and proving on the whole cooler. Paint may be so compounded and laid on floors as to suffer but little injury, even when exposed, in a long course of time. Should the colors become dull a slight varnishing will suffice to renew much of their pristine freshness. There are many rooms in a house which would be all the better for not being fully carpeted. Such especially are bedrooms. When we speak of painting a floor we do not refer to giving it a uniform hue. The handsome designs carried out in encaustic tiles may be repeated in color. Geometrical figures centered with small leaf patterns are peculiarly appropriate; so, too, a host of fresco patterns, these being varied in successive tiers. Longitudinal lines representing the chromatic scale of colors might be repeated at certain intervals. Diagonal lines in different hues, lying athwart each other, in basket-work style, would have a good effect. The borders, as a matter of course, should be differently treated.

## Second Prize Design in the Seventeenth Competition.

By means of our lithographic plates this month, and the engravings upon this and the following pages, we present the perspective view, floor plans, elevation and details



*Second Prize Design, Seventeenth Competition.—Details of Porch.—Scale, ½ Inch to the Foot.*

of the design receiving the second prize in the Seventeenth Competition conducted by this journal. The design is by Howard P. Miller, of No. 717 Walnut street, Philadelphia. Mr. Miller has chosen for his subject a detached dwelling, and his perspective shows a building in the midst of a pretty lawn, and on a small knoll. The style of architecture is a kind that has been very popular the past few years, and the treatment is very appropriate for the situation chosen. The building impresses one as being symmetrical from whatever point it may be viewed. The roof is its most striking characteristic, and its weather qualities, from its shape, should be unquestioned. In planning the house Mr. Miller has varied from the conventional types which have characterized many of the plans which we have published in the past. A smaller number of rooms are shown than would ordinarily have been arranged in a house of the dimensions given. The parlor and dining-room and kitchen occupy almost the entire first floor. A spacious hall, pantry and other accommodations are provided. The parlor and dining-room are well lighted, and from the imaginary location of the house command excellent views. They are in every respect cheerful rooms. The chambers in the second floor are spacious, and are provided with abundant closet room. The attic is utilized, furnishing two chambers and tank-room. The details are comparatively few, and are very simple in character.

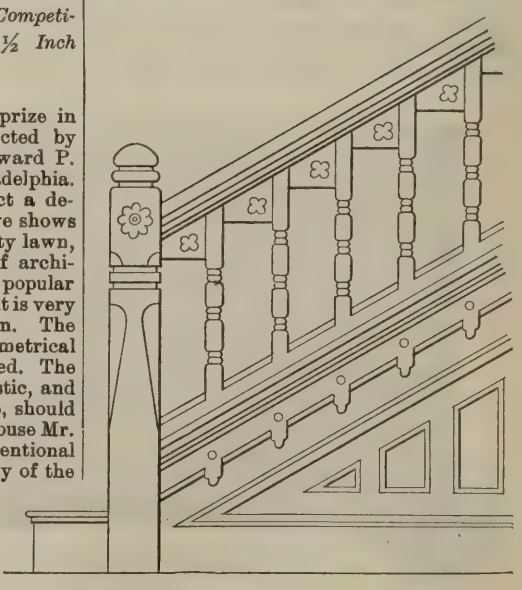
The following is a brief epitome of the description accompanying Mr. Miller's design: Particular attention is called to the arrangement of the plan as regards the following points: The fireplace at the end of the entrance hall, the location of the stairs and the view from the further side of the parlor to the further side of the dining-room. Attention is also directed to the simple outline of the ground plan. Projections, so far as possible, have been avoided which would affect digging and foundation work. In point of construction 6 x 6 studding is recommended, on which thick building paper is first nailed, and after this German siding, finishing with shingles, as shown. The inside to be finished by plastering. The outside woodwork to be of white pine painted three coats. The shingles to be of cedar. The joists to be of hemlock, and the roofs to be covered with dark-colored slate. The chimneys to be of brick, and the crestings and finials of cast iron thoroughly painted. The staircase to be of ash finished in oil. The balusters turned and the rail molded, the fireplaces to have wooden mantels. The fireplace in the hall to have a mantel of ash finished in oil, and the seat in the hall to be also of ash. The dining-room finish to be of cherry. The parlor finish to be of cherry also; the latter stained to get a slight reddish color to the wood. All the other inside woodwork to be of white pine thoroughly painted. In the dining-room windows in the upper sash cathedral glass is to be used. The staircase window to have tinted glass. The tank in the attic to be made of cedar and to hold 500 gallons. The floors to be laid with No. 2 Carolina pine, tongued and grooved. The following is a summary of the estimated cost of this building:

| | |
|---|---|
| Excavation and stonework | $360 |
| Brickwork | 572 |
| Lumber and roof | 993 |
| Paint and glass | 546 |
| Inside finish | 800 |
| Hardware | 298 |
| Total cost | $3,569 |

## Use of Sandpaper.

The following article on the use of sandpaper, which we find in an exchange, we have no doubt will be of interest to our readers:

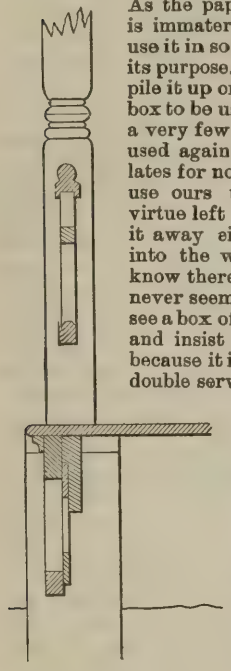
In handling this subject we expect to



*Side Elevation of Staircase.—Scale, ½ Inch to Foot.*

tread on the toes of both bosses and workmen. Sandpaper occupies a very important position, and, as it is more frequently used and in greater quantities than almost any other single article, it becomes a serious

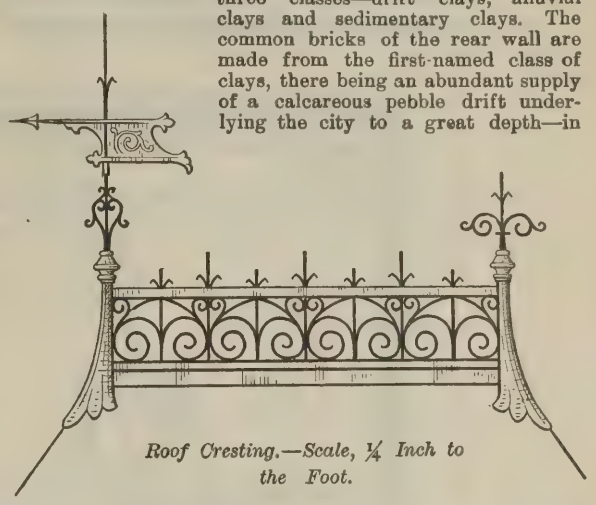
question as to cost. The workman, if so disposed, can materially reduce or increase the cost by using the paper up thoroughly or only using it half. We have seen some throw the piece away if only the edge was off the paper; others would use the edges and corners, and the center be good; and others, again, the center and leave the corners good. This is a waste. As the paper is given to use, it is immaterial what shape you use it in so that it has answered its purpose. It does no good to pile it up or stow it away in a box to be used again; except in a very few cases it never gets used again, and only accumulates for nothing. We generally use ours up until there is no virtue left in it, and then throw it away either into the fire or into the waste-box. Now, we know there are some bosses who never seem satisfied unless they see a box of refuse paper around and insist that we must use it, because it is to them like getting double service out of it. So they do, but at what a cost! Sandpaper as bought by them stands them in the neighborhood of about ½ cent per sheet. Divide that into, say, eight parts, which makes the cost about $\frac{1}{16}$ cent per part. It is used until the cutting edge is off and then thrown to one side. It has done all that can be expected from $\frac{1}{16}$ cent. Now, to use it again will require at least two-thirds more time than at first. Say a man is getting 20 cents an hour; he can use the eighth part of a sheet up in about from 5 to 10 minutes, according to the condition of the job he is doing. Give him 10 minutes, and he has done, say, one-half of a large panel. Now make him do the other half with the same piece of paper, and I think I would not be far wrong when I place the time at half an hour, even if he could do it at all, which I doubt. The question is, Which is the more valuable, the paper or the man's time? In the first instance, the man occupies one-third of the half-hour at a cost of 3⅓ cents in time and $\frac{1}{16}$ cent in paper. To cover the same amount of surface with the same piece of paper again would bring the cost of the time occupied on the second half to 10 cents, from which might be deducted $\frac{1}{16}$ cent for the use of old paper. In other words, in trying to save $\frac{1}{16}$ cent we have actually lost 20 minutes in time and 6⅔ cents in money, enough to buy over 13 sheets of new paper. As I said before, we use our paper as long as there is any virtue in it, and no longer. We turn and cut it up so as to get all there is of service in it, and then cast it away.



*Details Second Prize Design, Seventeenth Competition.—Vertical Section Through, Porch Finish.–Scale, ½ Inch to the Foot.*

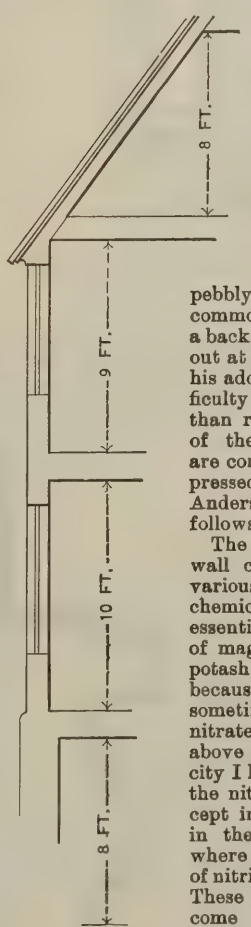
## Efflorescence on Brickwork.

A careless remark of a Western architect, a short time since, has given him more notoriety, we dare say, than all the professional work that has been under his charge since he engaged in business. "I will give any man $100,000 who will produce anything that will prevent a wall of pressed brick from turning white." These are the words that have given him such prominence for the moment. The sentence we have quoted above has been as generally republished in the trade and scientific papers as anything we have lately seen. Even the funny men have taken their turn at it and have built air castles upon the probable wealth of the architectural profession indicated by the ability of one of its members to so easily offer a very large sum for what would seem to be an insignificant discovery or invention. The remark, it is said, was called forth by the appearance of the walls of one of the finest office buildings in Chicago, which was recently completed at a cost of $500,000. The brick walls are covered by numerous streaks and splotches of white, displeasing to the eye and very generally spoiling the architectural effect of the pile. The efflorescence not considered injurious to the wall, and it is generally explained as being a formation of sulphate of magnesia. It is believed that it is brought out of the brick by the moisture in the atmosphere. In very dry seasons it does not manifest itself as much as in wet weather. Various expedients have been resorted to to prevent this appearance. Some walls of pressed brick are oiled as soon as they are completed. This prevents the appearance of the white for a while, but still it comes to the surface in the course of time. Sometimes painting is resorted to, but even through heavy coats of paint this white incrustation will occasionally make its way. Something the equivalent of the white blotches on brick occasionally occurs with stone. Its appearance in the latter case, however, depends altogether upon the nature of the stone.



*Roof Cresting.—Scale, ¼ Inch to the Foot.*

The subject is of general interest, however considered. The following paper, read by J. C. Anderson before the recent meeting of the Illinois Association of Architects, bears upon the question, and affords many particulars which are of interest to builders. It will be noticed that this author claims that the trouble is not in pressed brick, but that it comes entirely from the magnesia in the mortar and the pebbly impurities of the common brick used as a backing. He also points out at the conclusion of his address that the difficulty is promoted rather than restricted by some of the washes which are commonly applied to pressed-brick walls. Mr. Anderson's paper was as follows:




*Vertical Section Through Walls of House. Scale, ⅛ Inch to the Foot.*

The substances of this wall coating I find by various experiments and chemical analyses to be essentially the sulphates of magnesium, soda and potash. I say essentially, because other salts are sometimes present as nitrates of the alkalies above named. In this city I have never found the nitrates present, except in one or two cases in the walls of barns, where a high condition of nitrification prevailed. These coatings do not come from the facing brick, as has been generally supposed, and I desire to be distinctly understood when I say that this is not only true of any one particular kind or make of pressed brick, but it is true of several kinds of pressed brick commonly used in this market. The main cause of the evil lies in the lime of the mortar—or, more properly, the magnesia present in the lime of the mortar—used in laying up both the common and pressed brick. The bricks are made from common clays, nature's chips, once drifts and sediments upheaved by igneous action into mountains and again planed off, disintegrated and sent down from the mountain hights into the lowlands by chemical and aqueous agencies. These clays are of three classes—drift clays, alluvial clays and sedimentary clays. The common bricks of the rear wall are made from the first-named class of clays, there being an abundant supply of a calcareous pebble drift underlying the city to a great depth—in fact, only clays cheaply accessible for this grade of brick. About 20 per cent. of the bulk of this clay deposit is represented by small stones or pebbles of various kinds and sizes intimately commingled with the clay. These pebbles, for the most part, are made up of dolomite limestone—about 12 per cent. calcareo-magnesian and 7 per cent. granitic and feldspathic, and about 3 per cent. of their bulk of iron pyrites (sulphite of iron). Besides these pebble impurities there is also a portion of finely divided magnesia and potash present in the clay, and a quantity of coal screenings is added to the mass, all of which go to make up the complete brick, which, after the burning process, enters into the rear walls, and has an important bearing upon the subject, which will be more fully explained hereafter.

The facing brick are of wider range and of quite a different character, being made from the alluvium and sedimentary clay deposits, few of which contain any of the efflorescing germs in such quantities as to be producible on the face of the brick under the severest tests. This is especially true of the third class of clays, which are the deposits of fresh-water sediments, and are therefore practically free from the alkaline earths.

In the mortar in the walls will be found the main germ or primary cause of the evil. Here is an analysis of the wall coating:

| | |
|---|---|
| Insoluble matter (brick dust) | 2.14 |
| Lime | 1.68 |
| Potash | 0.08 |
| Magnesia | 14.57 |
| Sulphuric acid | 32.42 |
| Water | 49.85 |
| Total | 100.74 |

It will be seen that these scrapings are nearly pure Epsom salts or sulphate of soda:

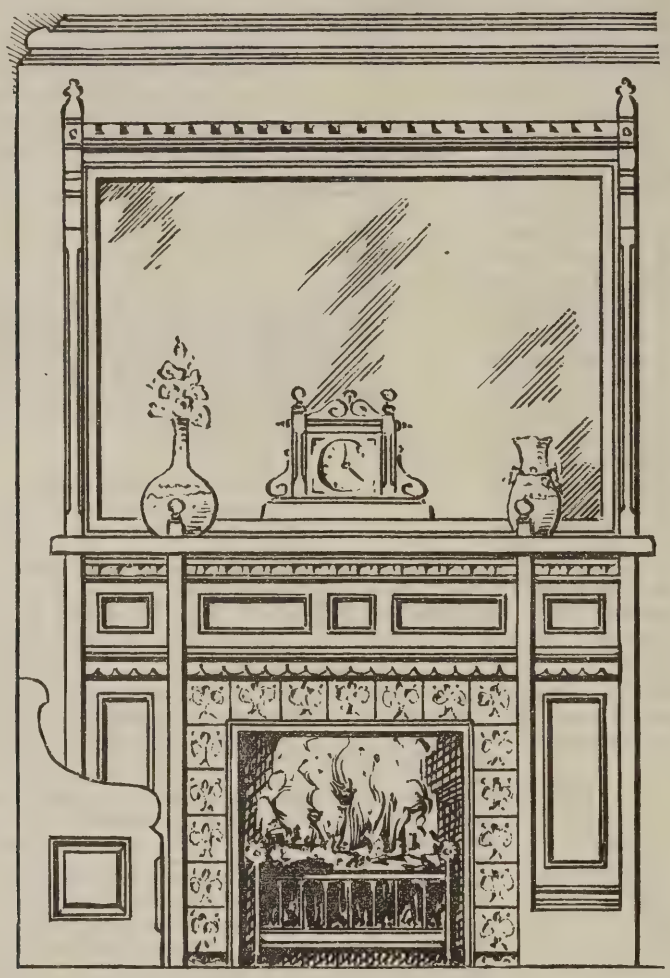
| | |
|---|---|
| Magnesia | 16.26 |
| Sulphur | 13.52 |
| Water | 51.22 |
| Total | 100.00 |

This sample for analysis I obtained by scraping from the walls of a prominent building in this city. It will be seen by the example, which is a fair specimen of all the others, that the sulphate of magnesia is the predominate substance.

I have already, in the discussion of common brick clays, described the presence of sulphite of iron and coal screenings. In the kiln-firing the sulphur is eliminated from the iron sulphite and coverted into sulphuric acid and is absorbed by the brick, and a like conversion takes place with the sulphur contained in the coal screenings. Analysis of the common brick shows sulphuric acid, as well as the soda and potash before referred to as belonging to the clay impurities. The sulphur is eliminated from the iron sulphate and coal screenings at a red heat in the kiln-firing in the form of sulphuric acid and sul-

phurous vapor. The sulphuric acid combines with the brick, and a part of the sulphurous acid, if left free, would ascend to the atmosphere above, but being confined within the brick unites with such bodies found there as have any affinity for the acid. These are the bodies present having the highest alkaline properties, being the potash of the coal screenings, residuum and calcio-magnesian pebbles present in the brick, potash, lime and magnesia, each taking up the equivalent of the acids in its order and converting it to a salt. Now, I will proceed to describe how these salts find their way to the face of the front walls of a building. In laying up the walls the common bricks are saturated well with water to prevent too rapid absorption of the water from the mortar, thus causing it to set too quickly, and as the most of these alkalies are insoluble in their first condition, all of them as sulphates (except the lime) are highly soluble in water, which takes them up in solution, and in the process of the drying out of the walls are carried through the facing brick to the point of natural evaporation, which is the face side of the wall, where it comes into contact with the drying, water-absorbing influence of the atmosphere, and as water goes off distilled by nature's laboratory the residuum salts which were in solution with it up to this point of evaporation are left in crystal form upon the surface, where they remain until the walls are thoroughly dried, or until the walls are wet by a rain-storm, or a change of weather brings a greater degree of moisture in contact with the surface of the walls than the brick contains when the crystal dissolves, and the solution will be absorbed back into the brick, to appear again in dry weather.

I will offer some suggestions which I deem important in the way of remedying the evil. The best method which I am able to suggest is to provide a pure mortar for laying up the facing brick, and then isolate this part of the wall in the construction from the rear wall with a suitable impervious material, and thus cut off the osmotic action between the two walls. It is also suggested that, as water saturation is one of the elements of crystallization, and, in fact, the vehicle that penetrates the walls, gathers up and conveys the poisons to the surface, as little of it should be used as possible in the construction, and that every means should be provided to prevent the saturation of the walls by rain-storms during the process of erection, and all safeguards provided in the construction of the buildings themselves to prevent saturation. It will be noticed that wherever the walls are most exposed to the direct wash of the rains, as about leaky spouts, &c., there is a plentiful supply of the exudations. This is particularly noticeable about the top walls and chimney-tops. Suitable impervious wall cappings, with projecting drips, should be provided for the chimney-tops, wall-tops and copings. I wish to emphasize what I have here said, and what I have repeatedly said to some of you, and which is also embodied in a paper of public record of four years ago, which I have demonstrated over and over again, that these exudations do not come from the pressed facing brick, as has been erroneously supposed and commonly alleged, but they come from the magnesia of the mortar and pebble impurities of the common brick, the evil being highly promoted by the customary practice of washing the walls with hydrochloric and sulphuric acid compounds used in cleaning walls.

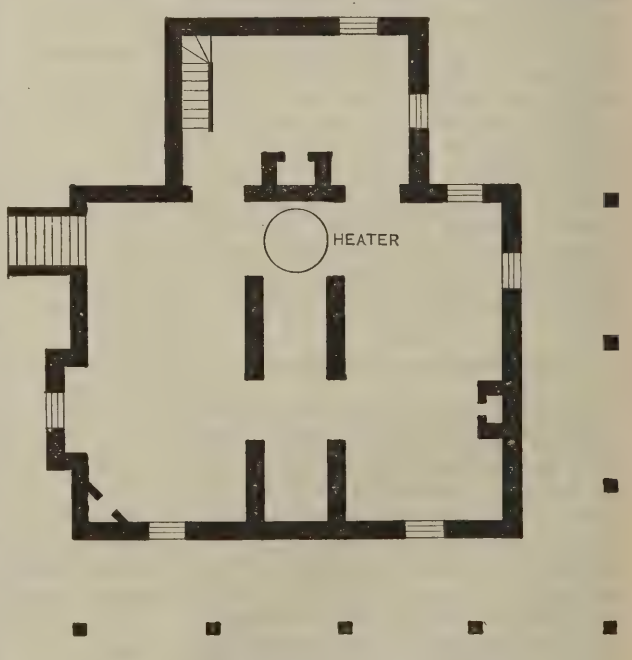


*Details of Second Prize Design, Seventeenth Competition.—Fireplace in Hall.—Scale, ½ Inch to the Foot.*

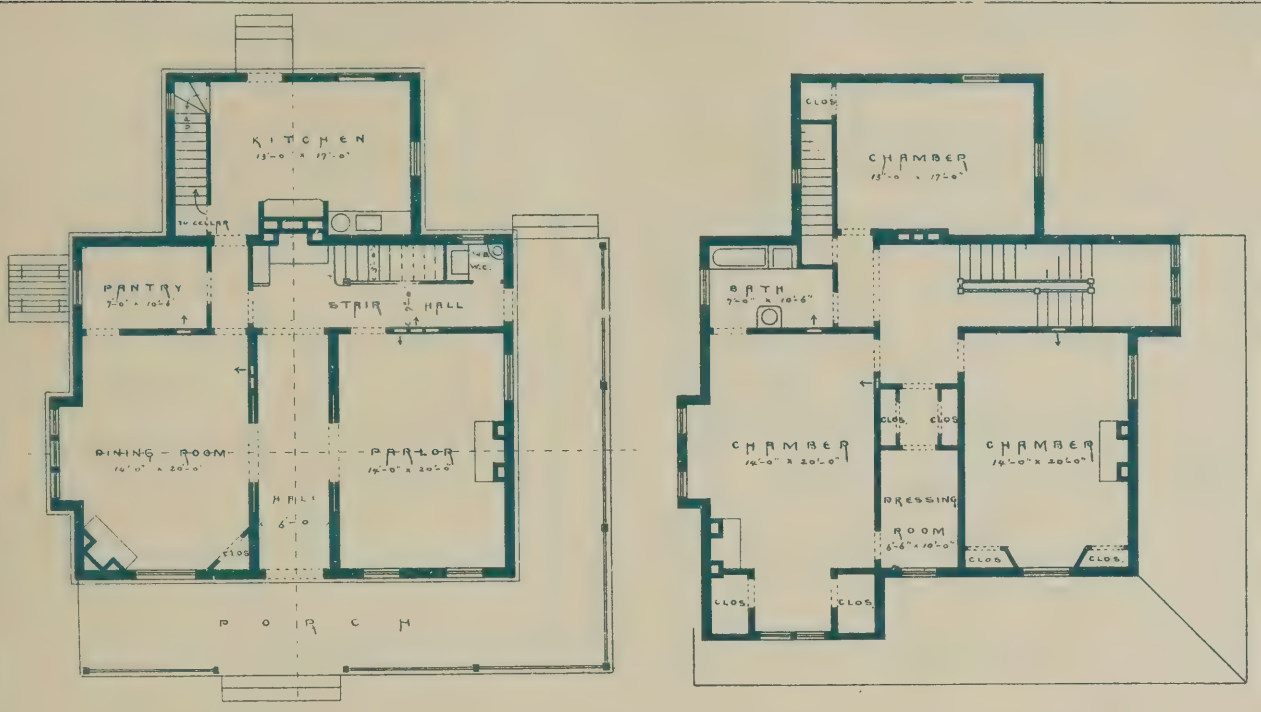
## Metal in Ancient Engineering Works.

The frequent use of the arch in Roman architecture, instead of beams and joists, as now practiced, and the frequent use of bricks, says R. Ritchie, may serve to explain why metal was not more required in their building and great engineering works, such as the celebrated stone bridge over the Rhone, built in the reign of the Emperor Trajan, consisting of 20 arches, and other great works. That timber, however, must have entered largely into the construction of their buildings is shown from the conflagrations of their cities. Cæsar's bridge over the Rhine, constructed when the Romans first invaded Germany, was made of timber, also the Pons Publicius at Rome. Although it is not easily ascertained from history to what extent iron was used in the construction of buildings by the Romans, and although, from its perishable nature, it could not be expected that many of its applications would reach these times, yet there is ample evidence, from what has been shown, that its utility was appreciated and its use common. It has been said that the large stones of the aqueduct bridge at Nîmes have been joined together without cement by ligaments of iron. In domestic buildings iron was used, according to the Roman authors, for many purposes similar to those to which it is now applied, such as the making of nails, bolts, locks, hinges, hooks, pillars, gates. For the last of these probably bronze was more frequently used, as the two gates of the Temple of Janus, which were opened in war and shut in peace, consisted, according to Livy, of brass. The brazen gate of the Pantheon is described as having been of great magnitude and of fine workmanship. When historians have recorded that there were 420 temples at Rome crowded with statues, one may easily conceive that bronze casts would be extensively used. Even brazen columns or pillars were constructed at Rome, as the Columna Ænea. At the Columna Mænia, named after C. Mænius (A. C. 417), were placed the brazen beaks of captured ships.

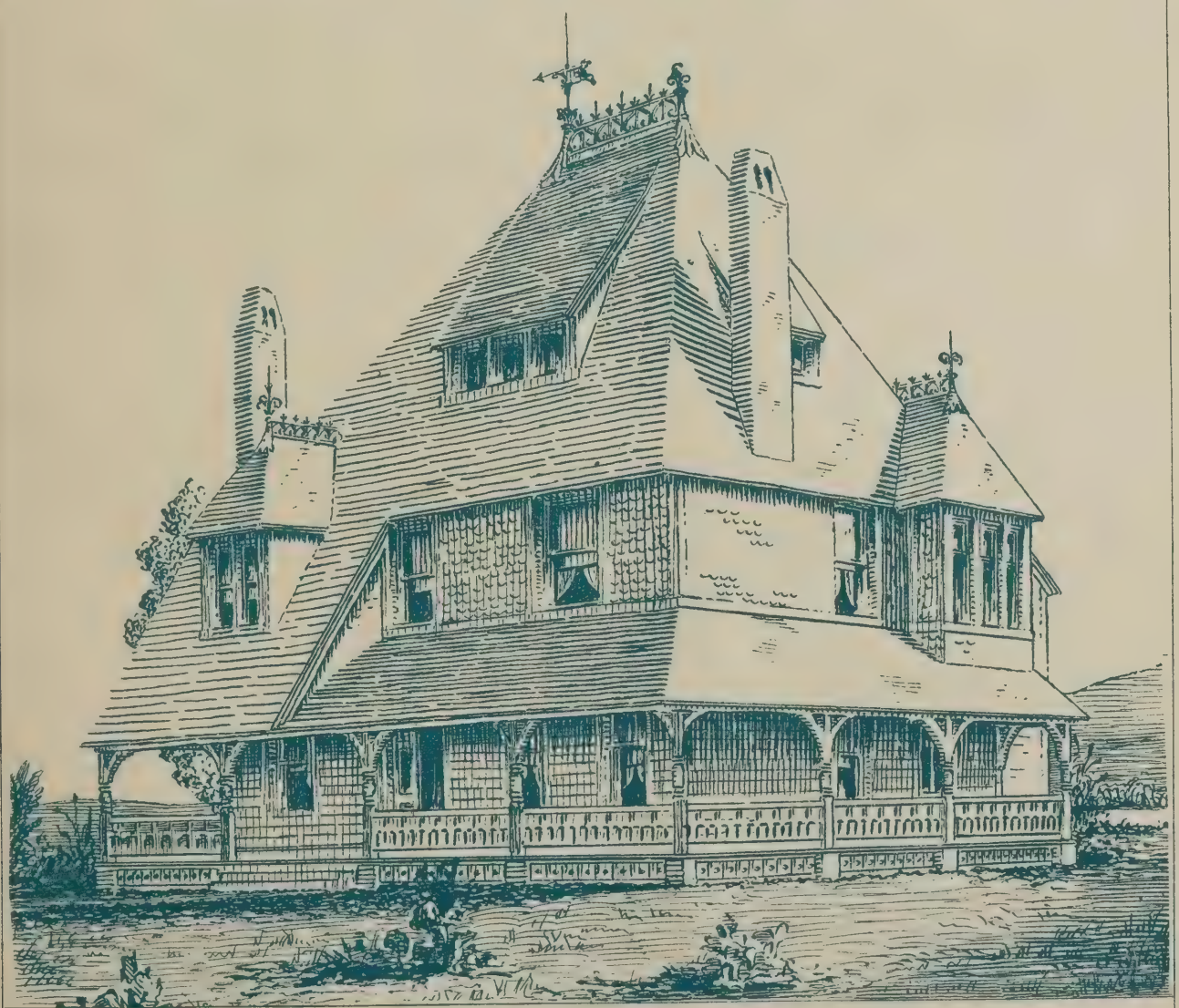
According to the *Building and Engineering Times*, one cause of the efflorescence of bricks, often so disastrous to the appearance of a costly façade, and frequently injuring painters' work in interiors by forcing its way through plaster and paint, is commonly due to the fact of the bricks not having been sufficiently burnt. Good terra-cotta, subjected as it is to intense firing, does not display this feature.




*Cellar Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.*

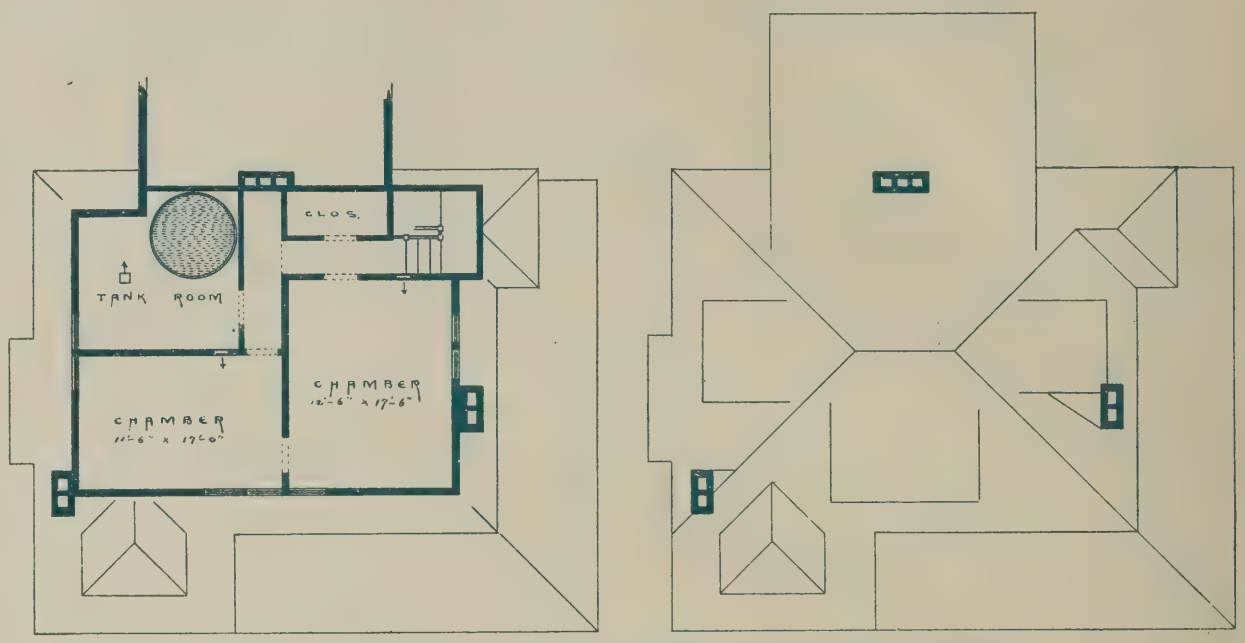



FIRST AND SECOND FLOOR PLANS.—SCALE 1/16 INCH TO THE FOOT.

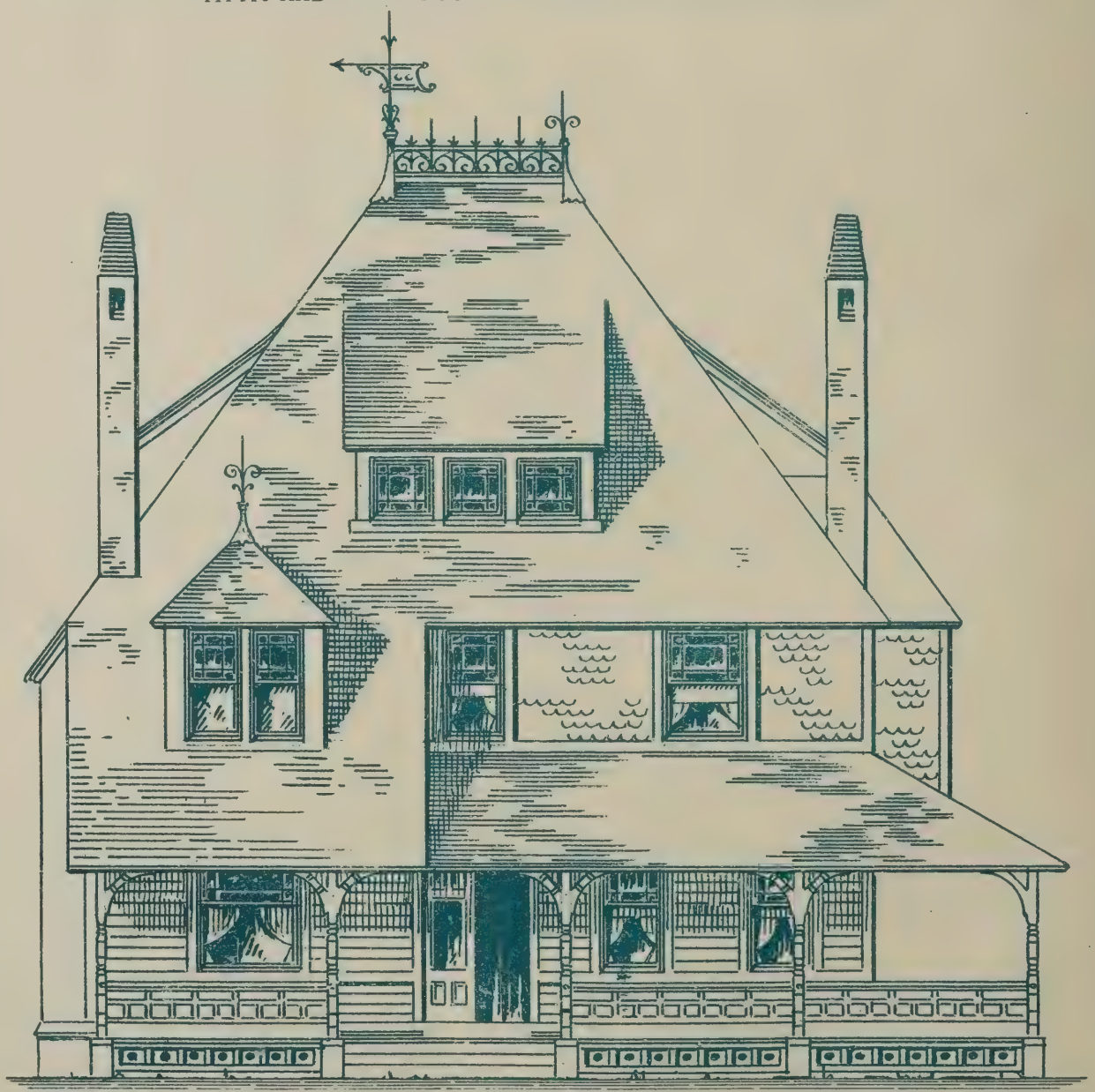


SECOND PRIZE DESIGN IN THE SEVENTEENTH COMPETITION.

*HOWARD P MILLER, ARCHITECT, PHILADELPHIA.




ATTIC AND ROOF PLANS.—SCALE 1/16 INCH TO THE FOOT.

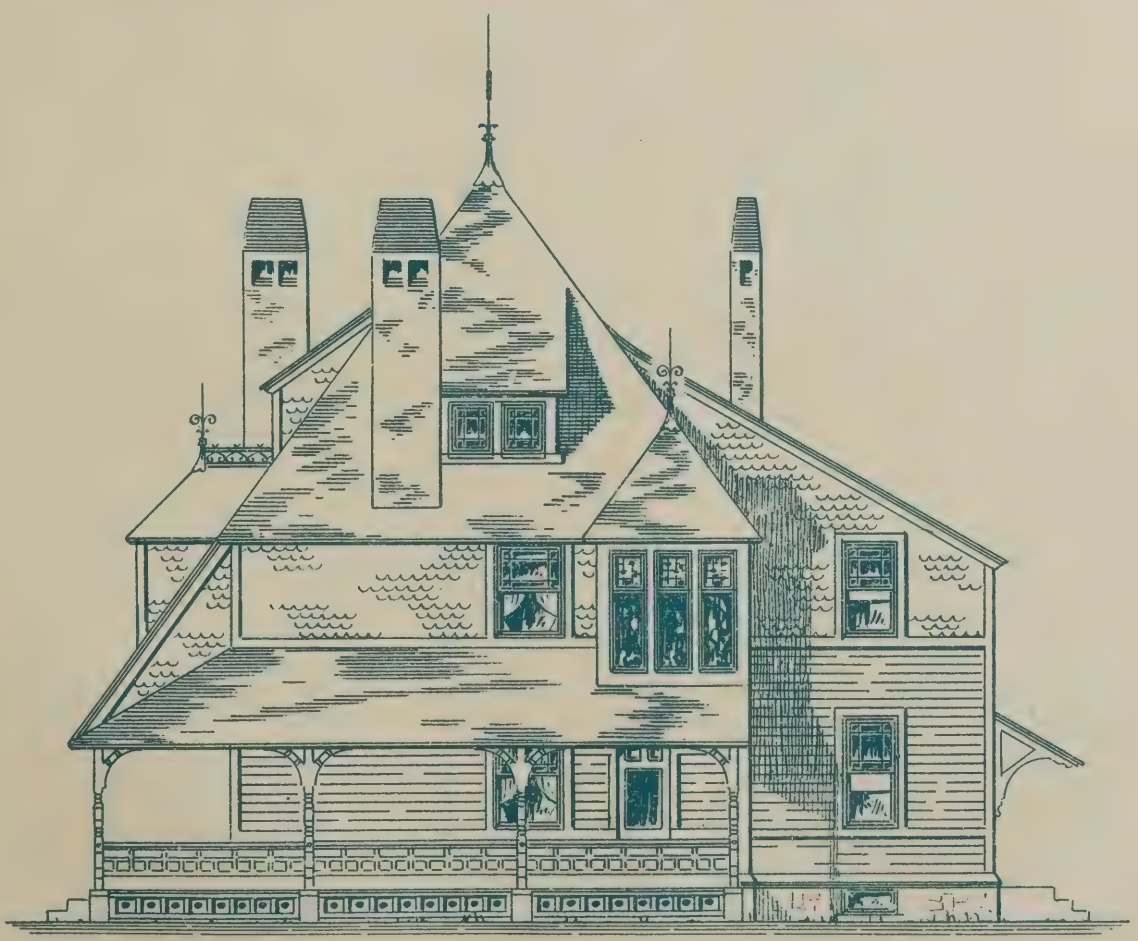


SECOND PRIZE DESIGN, IN THE SEVENTEENTH COMPETITION.

FRONT ELEVATION.—SCALE 1/8 INCH TO THE FOOT.

PLATE XXVII.

SIDE ELEVATION.—[LEFT.]—SCALE, 3/32 INCH TO THE FOOT.



SIDE ELEVATION.—[RIGHT.]—SCALE, 3/32 INCH TO THE FOOT.

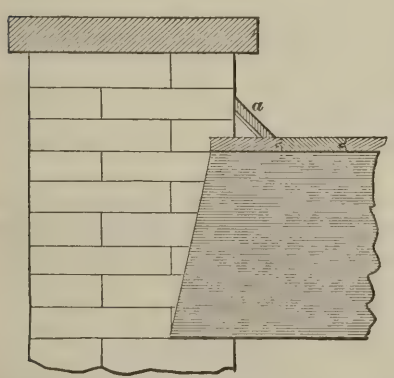
PLATE XXVIII.

SCETCHES IN BRUGES. BY WALTER ASTON.

# CORRESPONDENCE.

### Storm-Proof Tin Roofs.

*From* "TIN CHIPS," *Chicago, Ill.*—The importance of having tin roofs storm-proof can hardly be overestimated, as, when a tin roof is accidentally blown off, the event is used for years after as a sort of text by the opponents of tin roofs. This is especially the case with the gravel roofers, as they point with pride (?) to this kind of roof as one that cannot be blown off on account of the fractional part of a gravel bed they put on top of the tar to make it fire-proof. They never speak of the tendency the tar has in warm weather of slowly running down the roof, leaving the upper part almost devoid of any covering but the paper and gravel. I was on a roof last summer where the tar or pitch was over 2 inches thick near the conductor head. But then it is expected a gravel roof will require repairs now and then; it is natural. When a tin roof requires repairs a great hubbub is raised. I was on a gravel roof some time since where the tar had all run off of the paper where it was bent up against the sides of the fire walls to form a flashing, and the rain had so washed away the paper that one could stick his finger through most any place. Supposing Noah's Ark should be discovered and the tin roof on top should be found to be in such a condition, then there would be another argu-




*Storm-Proof Tin Roofs.—Fig.* 1.—*Means of Finishing Against a Fire-Wall.*

ment against tin roofs, and there would be a big law-suit between the heirs of Noah and of the tinner who puts on the roof. While the tin roofer may fully realize the importance of having roofs so they will not take unto themselves wings and fly away, he may also think that under under ordinary circumstances he does as much work for the money as the average mechanic.

If the general public could only be induced to be a little more liberal with the disbursement of cash to the roofer, and not run all over town to find the person who would put on a roof for the least money, and then offer the job on conditions that the trough and conductor would be thrown in with the job—if the public were a little more liberal, it would be pleasanter for the roofers to study up any improvement there might be made in the present way of doing things either by themselves, the carpenters or the masons. The suggestion offered by the Editor of *Carpentry and Building* regarding the necessity of having the wooden roof under the tin as air-tight as can be is a very valuable one. It is evident to do this that the boards should be of good material and well put on. In most cases the roof-boards are bumped against the walls, which leaves an air space between them and the brick, especially when the brickwork is uneven and rough. This could be prevented by having part of the roof-board laid in the wall, as shown by Fig. 1, or the corner formed by roof-board and brick be filled with mortar, and a board fitted over to lay the tin on, as shown by *a*. As a chain is only as strong as its weakest link, so a roof, from a cyclonic point of view, is only storm-proof when every part is capable of resisting the force of the wind. And one point that people are not apt to notice, although the wind is, is at the eaves or lower edge of the roof. Fire also sometimes pays more attention to this point than could be desired. Fig. 2 shows a very poor way of leaving the lower edge of a roof if the wind and fire are to be kept out. I once saw a building catch fire from a small burning building below at this point, and the fire was extinguished with a

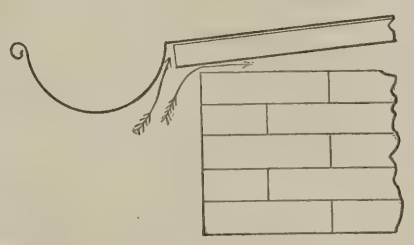


*Fig.* 2.—*Poor Way of Finishing Eave.*

great deal of difficulty, as it was almost impossible to tell just where the fire was after it once got started under the roof.

It is quite evident the tin should be carried under the roof-boards, the space well pointed up with mortar. One of the weakest parts of an old tin roof is apt to be at the flashings, or where the tin joins the brick wall. I have painted old tin roofs when it was almost as much trouble to clean off the mortar and brick that had fallen from the walls as it was to do the painting. After the tin has been joined to the wall in a proper manner it is a good plan to paint or tar over the fire-wall, which prevents the rain from soaking in the mortar and brick. When the water freezes it expands, and, consequently, explodes off the mortar and brick, making it comparatively easy for the wind and rain to enter. While the roofer may not be blamed when trouble does ensue from this source, it is quite evident that if the walls are painted with some water-proof substance there will be no occasion for his being blamed. When the tin roof runs over the cornice it is important that the cornice should be fitted tight to the brick, or at least so the air cannot be drawn up through and under the tin.

In order to construct a tin roof so it will not "fly through the air with the greatest of ease," as did the young man on the flying trapeze, it is evident a great dependence must be placed on the nails that hold it down. Perhaps if we could only figure how much holding-down power was possessed by tar and gravel we could arrive at some understanding of how many nails each sheet of tin should have, though there is some difficulty in finding out how much each nail, in all of the roofs that have been and are to be put on, will hold. Perhaps Dante, when he wrote his "Inferno," had some conception of the heat the boards under a tin roof are exposed to during a hot summer day, when

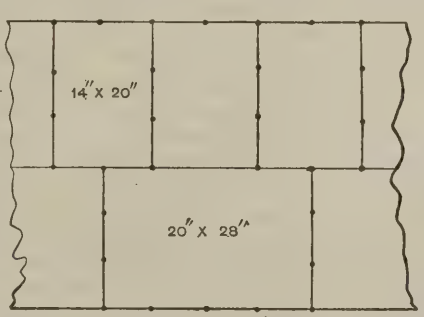



*Fig.* 3.—*Comparison of Different Sizes of Plates with Reference to Nailing.*

the sun is pouring down his rays with 17 horse-power force. The roof-boards become so baked that the roofing nails quite lose their grip, and to put an evaporating pan under the roof to keep the boards moist would be rather too new, or fresh, as it were. I would be almost as timid about recommending the use of screws in the place of nails as in recommending the use of an evaporating water-pan, yet if the owner of a building was willing to pay for having the roof put on with screws instead of nails there is no law to prevent the roofer from so doing.

Regarding the kind and number of fastenings to be used to hold down the tin, a valuable lesson can be learned from the rule used by an old lady for making good coffee. It was, "Get good coffee, and put in enough." I came very near writing that when 14 x 20 tin was used more nails to the square would be used than with 20 x 28. It might be said, "be apt to be used," as with 20 x 28 there are no nails through the center of the sheet, as there would be if two sheets of 14 x 20 were placed together, as shown by Fig. 3, where the dots represent the nails, though no particular system of nailing is intended to be shown. As it seems rather difficult to so construct the roof-boards that they will be air-tight, the question naturally arises, Is it possible to construct a tin roof so it cannot be blown off, even though the wind should blow as hard as it is said to out West, where, after the farmer has plowed his land, a hard wind comes along and blows all of the plowed-up soil into the next farm, and then the question is, "Whose farm are those?"

Now there is nothing that will bother me so much as to be asked to do something and not know how, or be able to find out how to do it. So if I was required to put on a tin roof that could not be blown off, what could be done? As it is the air under the roof seeking to escape into the partial vacuum above that causes the tin to break open, then why not let the air escape if it wants to? This could be done by putting a number of ventilators into the tin roof, so the air could escape, but so constructed that the rain could not enter. Such an experiment would not cost much, and almost any owner of a building should be willing to pay the slight expense for the chance the roof would enjoy of not being blown off and hung like drapery on some building on the opposite side of the street, as I once saw happen to a tin roof. Few realize the enormous pressure the wind can exert when it only makes up its mind to do so. For the benefit of the readers of *Carpentry and Building* I copy a table giving the velocity and force of the wind:

| Description. | Miles per hour. | Feet per minute. | Feet per second. | Force in lbs. per sq. ft. |
|---|---|---|---|---|
| Hardly perceptible | 1 | 88 | 1.47 | 0.005 |
| Just perceptible | 2 | 176 | 2.93 | 0.02 |
| | 3 | 264 | 4.4 | 0.044 |
| Gentle breeze | 4 | 352 | 5.87 | 0.079 |
| | 5 | 440 | 7.33 | 0.123 |
| Pleasant breeze | 10 | 880 | 14.67 | 0.492 |
| | 15 | 1,320 | 22. | 1.107 |
| Brisk gale | 20 | 1,760 | 29.3 | 1.968 |
| | 25 | 2,200 | 36.6 | 3.075 |
| High wind | 30 | 2,640 | 44. | 4.428 |
| | 35 | 3,080 | 51.3 | 6.027 |
| Very high wind | 40 | 3,220 | 58.6 | 7.872 |
| | 45 | 3,960 | 66.0 | 9.963 |
| Storm | 50 | 4,400 | 73.3 | 12.300 |
| | 60 | 5,280 | 88. | 17.712 |
| Great storm | 70 | 6,160 | 102. | 24.108 |
| | 80 | 7,040 | 117.3 | 31.488 |
| Hurricane or cyclone | 100 | 8,800 | 146.6 | 49.200 |

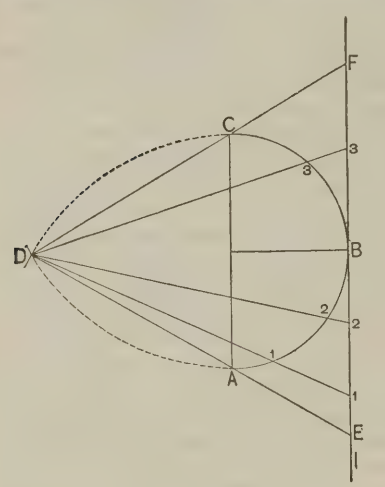
As a sheet of 20 x 28 tin covers about 4 feet, and the force of a hurricane is almost 50 pounds to the square foot, then a sheet of tin would have to bear a strain (provided it was applied) of 200 pounds—that is, direct or steady pressure, but the wind has a way of going steady-by-jerks that will loosen almost anything. Any one who has ever tried to pull a stick away from a dog will realize the exact way a roof feels in a high wind. Some time since there was a kind of barbed nail manufactured which was said to be almost as hard to pull out as a screw. If such a nail is so constructed as to be applicable to roofing purposes it would be a good plan for the manufacturers to make a few remarks upon the subject through the columns of *Carpentry and Building*, and, if such a nail is not manufactured now, it would be a good plan for the inventors to let car couplers, churns and farm gates have a rest—that is, not invent any more new kinds—and turn their attention to the production of a kind of nail that, when driven into a board, will stay there. The head should be large, so as not to pull through the tin easily. Supposing the tinner puts on a storm-proof roof,

how he is to get a hurricane to try it with in case the owner of the building insists on a trial before the roof is paid for? That is what puzzles me.

### Questions in Stair-Building.

*From* S. B., *New Brunswick, N. J.*—I again venture to propose a few questions which I trust you will endeavor to as kindly answer as you have those in the past:

1. How can the stretchout of an ellipse or semi ellipse, as A B C of Fig. 2, be found, and points in the curve, as 1, 2 and 3, be placed in the proper position on the line E B F? To illustrate what I mean I have drawn, Fig. 1, a semicircle with the points 1, 2 and 3 placed in the line E B F. This is not strictly correct, but very near correctness. This is from Loth's "Practical Stairbuilder,"




*Questions in Stair-Building—Fig.* 1.—*Obtaining the Length of an Arc of a Circle by Constructive Means.*

Plate 3, Fig. 12, page 17. Can some such construction as this be used with a semi-ellipse? The following diagrams, Figs. 3, 4, 5 and 6, are sent to show in what ways I have attempted to solve the above problem (and failed). Fig. 5 is based upon Loth's "Practical Stair-Builder," page 19, Theorem 43: "The circumference of an ellipse equals that of a circle whose diameter equals a mean proportional between the minor and major axes." As only a semi-ellipse was wanted, I used only half the axis and found the mean proportional as shown at Diagram No. 3, Loth's "Practical Stair-Builder," Plate 1, Fig. 18, page 10, Theorem 23, and as No. 4, Loth's "Practical Stair-Builder," Plate 3, Fig. 11, page 17, Problem 32, and also as shown

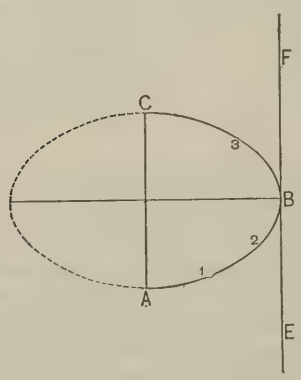



*Fig.* 2.—*Wanted a Similar Rule Applicable to Elliptical Figures.*

at Plate 4, Fig. 1, page 23, of Loth's "Practical Stair-Builder." Fig. 5 shows an ellipse and a mean proportional, D G, of half the axis found as above, which is the radius of the required circle. Fig. 6 show a semicircle drawn with this radius, the stretchout A B C of which, found as at No. 1, equals the curve A B C of the ellipse at No. 5; but I am still at a loss to know how to transfer the points in the elliptic curve, 1, 2, 3, to the line A B C. Thus, again, I have failed to reach as good a result as in the above when I tried other ellipses; in fact, this is the only one that came anywhere near correct by use of the above construction. I tried 11 ellipses of different sizes and proportions, and failed in all but the one shown, which

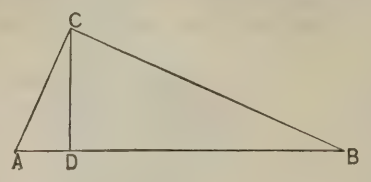



*Fig.* 3.—*An Attempt at the Solution.*

is about 4 x 5½. I used the same method with the others, and obtained all manner of results, among which was the following: With an ellipse 2½ x 2¾ the stretchout of the semicircle was longer than the curve of the ellipse. With an ellipse 2 x 4 it was too short. With an ellipse 3 x 9 it was a great deal too short, and so it went with the others, some short and some long. I used all possible care, and have tried hard to find my error, but have failed to do so. Can you explain this, or show me my error and help me?

2. Referring to Figs. 7, 8, and 9, I desire to ask, Why must the tangents in plan be truly tangent to the circle? This question may appear on the face of it to you to be a very foolish one for me to ask. I think I understand this point pretty well, and would not think of placing plan tangents any other way; but some time ago, in showing a person points in hand-railing, he asked me this same question and I could not answer it to his satisfaction. At least I failed to convince him that they must be so placed. He admitted that it was best to do so, but did not think we were compelled to do so. I was unable to make my drawings clear enough or failed to use proper words to convince him. He said the rail when finished would

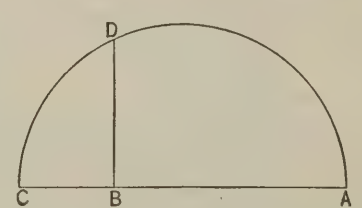



*Fig.* 4.—*Another Effort in the Same Direction.*

cover the circle and one piece join another correctly, though the joints would not be square with the tangents, and more work and trouble be given. He admits if the tangents were placed on plan at pleasure, as shown by Figs. 8 and 9, difficulties would be encountered, but does not understand why this could not be done if we were willing to go to the extra trouble and work. To illustrate, I send Figs. 7, 8 and 9. In Fig. 7 tangents are correctly placed and show a wreath over a quarter-circle, 1, 2, 3; one over more than a quarter, 3, 4, 5, and another over less than a quarter, 5, 6, 7. Fig. 8 shows the tangents placed at will, giving us as shown by them in plan 1, 2, 3, a piece over more than a quarter-ellipse, when only a quarter-circle is used; 3, 4, 5, less than a quarter-circle when more than a quarter is in use, and 5, 6, 7 more than a quarter-circle when less is used. Fig. 9 shows the tangents again placed at pleasure, and to judge from them we have 1, 2, 3 more than a quarter-circle when only a quarter-circle is really in use; 3, 4, 5 a quarter-ellipse, while more than a quarter-circle is covered, and 5, 6, 7 more than a quarter-ellipse, less than a quarter-circle being in use. Please inform me what effect it would have on the elevated tangents, elevated curved lines, on the joints and the working of the rail, to place the plan tangents as at Figs. 8 and 9, especially what effect would this have on the bevels to apply at the joints, so that I will have such points as will enable me to satisfactorily answer this question and convince a person that "tangents in plan must be truly tangent to the circle."

3. Referring to Fig. 10, which shows quarter-ellipse A C in plan for rail, A 1 being pitch over A B, and 2 3 pitch over B C, I desire to ask, Is not the center D the outer of the circle from which the ellipse is derived and also the center of the elevated ellipse? I believe 3 4 gives the directions to draw the ordinate 4 A. The lines 5 D and B 6 are parallel to 4 A. Are they not level lines? Is not 5 D the minor axis of the elevated ellipse, and does not this line give the place on the pattern where it may be made the width of the rail and the curve lines drawn by a rod? Would not a line drawn at right angles to 5 D through the center D of the ellipse as the line E D F be the direction of the major axis of the elevated ellipse? If the above points are correct, will they apply in the same way to a line, as 5 D, drawn to the center of the ellipse, as is here done, when less than, or more than, a quarter-ellipse

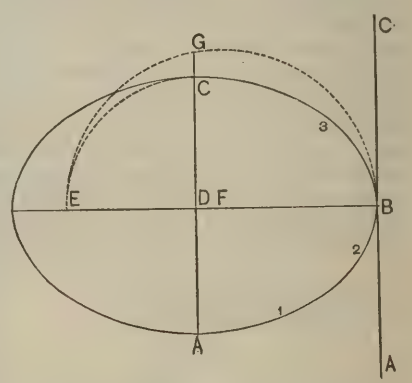



*Fig.* 5.—*Diagram Based Upon Loth's Method.*

is used in plan? If all this is so, how can the extent of the elevated ellipse be found or the length of the axis be determined, so that if desired the curves of the pattern could be drawn by a string and pencil or by the trammel?

*Answer.*—1. To find the periphery of an ellipse—or, for that matter, of a circle—for all such purposes as stair-building, pattern-cutting and the like, we recommend mechanical means rather than constructive methods, such as our correspondent has been trying, no matter how ingenious they are or how closely they approximate the required result. Stepping off with a pair of dividers, for example, would consume less

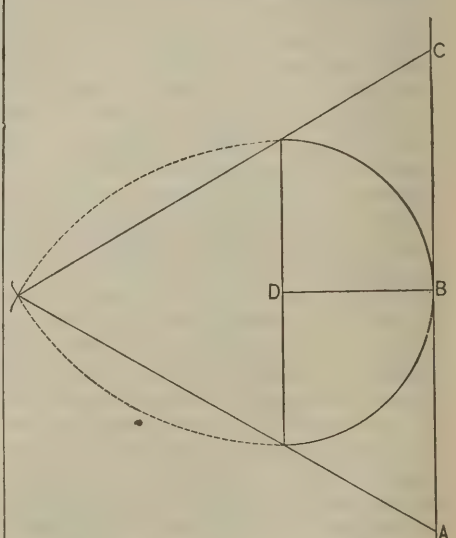
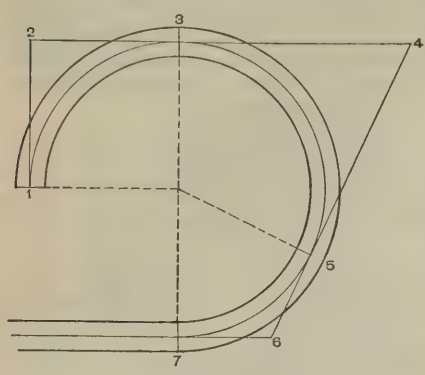



*Fig.* 6—*Semicircle Derived from the Preceding, and Measured by Rule Shown in Fig.* 1.

time and be far more satisfactory in the result obtained than making such a diagram as shown in Fig. 1. A very convenient way of finding the periphery of an ellipse for stair-builders' purposes is to measure it, using a thin strip of wood for the purpose.

If the ellipse is large, stick in a few nails just inside the line, and measure by bending the strip of wood around, marking such points as you wish to locate. On a small draft use a few common pins, and bend a strip of cardboard for a measure.




*Questions in Stair-Building. — Fig. 7. — Wreath Over Quarter-Circle, Wreath Over More Than Quarter-Circle, and Wreath Over Less Than Quarter-Circle, Tangents Correctly Placed.*

The rule our correspondent quotes from Loth is certainly a mistake. We give it as he sends it, for we have not the volume at hand by which to verify the statement. Suppose, for example, the ellipse be taken whose minor and major axes bear the relation of 1 to 4. Then 2 is the mean proportional. Now the circumference of the circle whose diameter is 2 is 6.28+, while the periphery of the ellipse is certainly greater than twice the major axis, which is 8. The formula for the periphery of the ellipse is as follows :

$$2 \sqrt{D^2 + 1.4674\ d^2},$$

in which $D$ is the major axis of the ellipse and $d$ the minor axis. For ordinary purposes

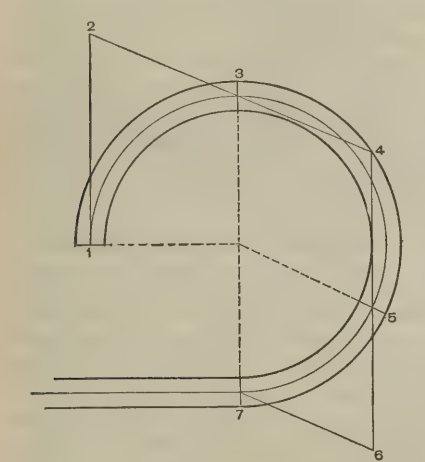



*Fig. 8.—Diagram Showing Tangents Placed at Will.*

we know of no better way of measuring the ellipse than that we have suggested.

2. The reason why the straight lines used in building the pattern are made tangents to the circle is because it is in every respect the proper and convenient thing to do, except, perhaps, in some case which, however, are not likely to occur once in a lifetime. First, we use the tangent to govern the butt joint, which for many reasons it is best to have square across the rail. Second, by being tangents to the circle they assist in giving direction to the curve in the elevated plan. Third, it is the direct and quickest way to come at the positive points in the work. For instance, if a man wanted to go from New York to Boston he would not in his senses go away around by Hudson's Bay to get there. As to the last inquiry under the above heading, we think the above answer is sufficient. To fully illustrate and answer all that is asked would occupy more space than we think is desirable to devote to this subject. Our correspondent's questions, while proper enough in themselves, verge upon the domain of pure theory, and are so far from the ordinary practice of every-day stair-builders as to be of less interest to our readers than others that might be suggested. We have been thinking for some time past that some reader in search of really practical help would propose some questions on stair-building in the Queen Anne style of construction and finish. Very little on this subject has yet been published.

3. Our correspondent's third query is one which has perplexed many stair-builders. He appears to be in error at every point after drawing the seat line and other corresponding lines in the plan. The center D, of course, remains the center of the elevated plane, and E F is also the proper line from which to measure to draw the elevated plan by the use of ordinates, but to give the direction of the axis of the ellipse in the

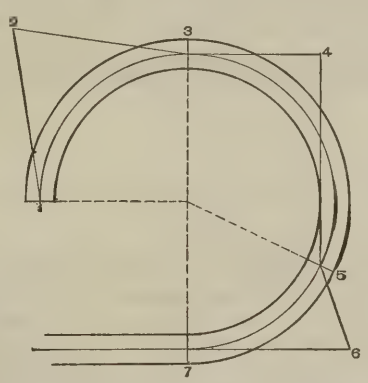



*Fig. 9.—Another Diagram Showing Tangents Placed at Pleasure.*

elevated plane is a question that, so far as we know, is yet unsolved. In this plan it will not vary much from the direction in which it now lies in the ground plan. The lines 5 D and B 6 may be used as measuring lines to locate the curve of the rail pattern, but neither of them will show where the width of the pattern is normal.

We are disposed to refer this question to our readers for solution. It is a nut to crack which it is worth the while of practical stair-builders everywhere to attempt. It may be stated as follows :

Given the plan of an elliptical prism cut by a plane at a given angle with the direction of cut other than in line with the major or minor axis, to find the direction and figure of the elevated ellipse produced by the cut without the use of ordinates ; or to

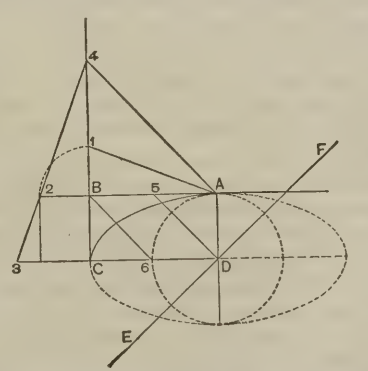



*Fig. 10.—Diagram for Wreath Over Quarter-Elliptical Plan.*

find the direction of the major and minor axes in the elevated plan even with the assistance of ordinates.

### Japanese Mechanics.

*From* E. P. K., *New York City.*—Your remarks in the June number upon Japanese mechanics and the education received by them are worthy of more than a passing notice. For four years at the School of Mines, this city, I had the pleasure of studying with three of the graduates of the University of Tokio, Japan, sent to this country by the Japanese Government to enlarge their knowledge in special branches of scientific research. One of them is now an underviewer in a Japanese Government colliery, another a metallurgist in the Imperial Mint at Osaka, and the other an instructor in qualitative analyses at the University of Tokio. They were rewarded for their ability at home by the appointment to study abroad what were considered superior methods of education. They possessed a strong admiration for our system of instruction. I have no doubt, from the capacity shown by them in their work, that they represented a very high order of Japanese intelligence and character. The faculty of memory was developed in them to a degree that would seem to us abnormal. Their readiness at remembering mathematical and chemical formulæ overwhelmed us, but they were deficient in perception and invention, slow to grasp a new thought or unravel an obscure truth, and received the well-deserved name of plodders. They were extremely good in technical analysis in following some carefully worked out scheme that had been made practical by some one else, but where original research was required, where slight differences in similar reactions had to be recorded, thoughtful discriminations made and reliable conclusions reached, they fell short of expectation. They possessed none of our native acuteness ; their mental process seemed to us slow and labored ; but a great allowance ought to be made to any foreigner at the difficulty of expressing a thought in our language. Their ability in freehand drawing is unquestioned, but in the use of the drawing pen in right line work they were not proficient, and in the production of artistic effects in india-ink work with the brush they were not successful. Their conduct as gentlemen, their close application as students and their social powers made them many friends, and reflected great credit upon their race and the University which they worthily represented. If the average American boy could have a little more of their thoroughness and patient application, and they a part of the push, the ingenuity and quick wit of the American boy, both would be greatly benefited and the world itself the gainer.

### Dictionaries.

*From* F. E. J., *Philadelphia.*—Will you please state in *Carpentry and Building* in what technical dictionary the definitions of the words "coach screw," "splined" and "pintle" may be found? These terms are used in the article entitled "Building to Prevent Loss by Fire," which appeared in the February issue. What do you consider the best technical dictionary for finding the definitions of words used in the building business, and also those occurring in civil and mechanical engineering ?

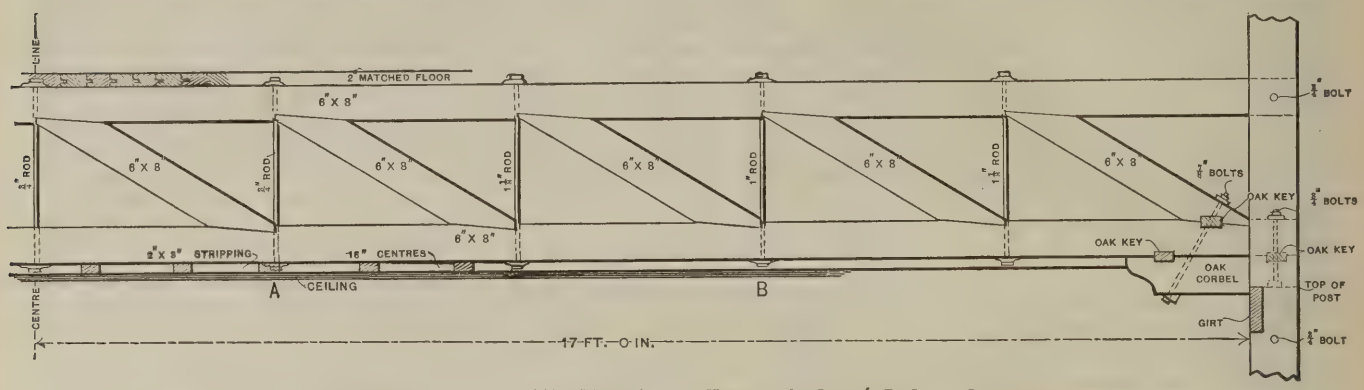
*Answer.*—In our own practice we do not find any one dictionary sufficient for the purpose. Our reference library is largely composed of books which in character are dictionaries, although many of them do not bear the title of dictionary. We perhaps get the greatest service from recent editions of the standard dictionaries, such as Webster, Worcester and the Imperial. For mechanical terms in general Knight's American Mechanical Dictionary, taking the original volumes with the supplement issued not long since, affords much information. The term "coach screw," about which our correspondent inquires, is both defined and illustrated in Knight's Dictionary, above referred to. It is included in the general class designated as screw bolts. It is a screw with a square head for turning with a wrench. It is pointed, so as to facilitate entrance into the wood. Such screws are sometimes called "lag screws," although the latter term has another and special significance. A "spline" is described by Webster as "a rectangular piece fitting the key-pieces of a hub and shaft, so that, while the one may slide endwise on the other, both must revolve together." This description evidently refers to machinery. The sense in which the term was used in the article referred to was that of a tongue set in between two boards or surfaces, being let into each a portion of its thickness. The idea is the same, save that in the sense in which the term is used in carpentry there is nothing

about revolution in it. Knight's Mechanical Dictionary repeats the definition given above and calls attention to the fact that the object is also designated sometimes by the term "feather"! In the dictionaries at our command we fail to find the word defined in the exact sense in which it was used in the article named, or in which it is very commonly used by carpenters and builders. A "pintle" is defined by Knight as "a pivot-pin, such as that of a hinge." It also has various special meanings more or less remote from this general idea. The literal definition of the word would be a "little pin," and it was in somewhat this sense that it was used in the article named. The part described by this term occurs under the main parts, and is of the nature of a pin to keep the base of the part firmly in position.

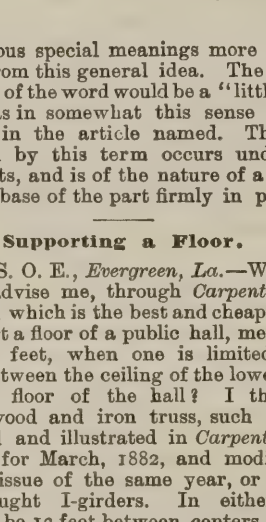
### Supporting a Floor.

*From* S. O. E., *Evergreen, La.*—Will you kindly advise me, through *Carpentry and Building*, which is the best and cheapest way to support a floor of a public hall, measuring 34 x 52 feet, when one is limited to 30 inches between the ceiling of the lower room and the floor of the hall? I think of using a wood and iron truss, such as was described and illustrated in *Carpentry and Building* for March, 1882, and modified in the May issue of the same year, or else to use wrought I-girders. In either case they will be 13 feet between centers and 34 feet long, and should be capable of supporting 32 tons equally divided between two points equally distant from the side walls and each other. I hope to see an answer to this question in the July number.

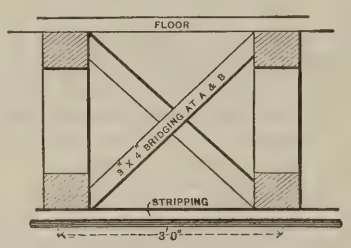
*Answer.*—Our correspondent omits several important particulars in propounding his question. For the lack of this data we are unable to answer him as fully and specifically as we would be glad to, and therefore we will confine our remarks to some general particulars applicable in all similar cases. Among the items concerning which we would need to have information in order to advise our correspondent intelligently are whether the building is brick or frame, and whether it is already in position or one that is in process of erection. The conditions that he names strike us as being somewhat unusual, and at the outset we are disposed to raise the question of the necessity of supporting a floor entirely from the side walls. Why not run a row of posts through the center, supporting a girder? This would be a very simple plan, and in the light of long experience in the cities would seem the best for our correspondent to employ. We doubt very much if there is any cheap way of supporting such a long span as our correspondent mentions. We submit a drawing of a truss that will answer provided the building is yet to be erected. The truss is to be constructed of Norway pine, the upper and lower chords being 6 x 8 in section. The tie-rods are ¾ inch in diameter. The diagonal braces are of the same size as the upper and lower chords. The manner of framing is very clearly indicated, and also the corbeling at the end, and the way of placing on the wall. The second view represents a section at the wall end. Our third diagram shows a section indicating that the trussesare to be placed 3 feet between centers and to be cross-bridged at four points in their length. This truss has been cal culated with an estimated load of 200 pounds per square foot, including the weight of the timber and an assumed factor of safety of five.




*Supporting a Floor.—Side Elevation of Truss.—Scale, ⅜ Inch to the Foot.*




*Section at Wall.*




*Section Through Two Trusses.*

In connection with a wide span of this character there are a number of things to be taken into consideration besides the floor trusses, and we should not advise any one to undertake the construction of such a building without having at his command practical experience in such matters, either in his own person or at the hands of an employee. Unless there are some special advantages to be gained, we would strongly advise our correspondent to run a girder through the center of the building, supported on iron columns. As we have already indicated, it is very rarely that it is necessary to provide for such a wide span floor as named above. Where such construction is attempted it is generally at the hands of ambitious but inexperienced builders, and often they endeavor to solve the problem of construction by means of boards nailed together truss fashion. These makeshifts very generally fail, and we caution our correspondent against them. Such a floor as named above might be supported on girders suspended by rods from the roof trusses if it is absolutely necessary to have the lower floor clear. This perhaps would be the cheapest way, since three large trusses would be sufficient. A large truss would cost very little more than a small one. This, too, would probably be the best way in case the floor is already in position. Tension-rods, or "hog chains," as they are sometimes called, might be introduced in a floor already in use, but the span being so wide and the depth so small in proportion to it there would arise the necessity of making the rods very large and placing them close together, so that the expense would be prohibitory.

In this connection a narrative of some instances of efforts to overcome difficulties of this nature may be interesting to our readers. A builder in the western part of this State endeavored to support the brick and stone work of a store front two stories in hight upon a wooden truss. The front was built in very elaborate style, the cut-stone and brick being brought from a distance. Only two days elapsed after completing the work before the order was received to take it down. By quick work it was taken down before it fell. An office building in Buffalo is suffering from the same kind of building. The floors are laid with joists formed of upper and lower chords, trussed with inch boards nailed on the sides. The total depth is 18 inches, and the floor span between walls is 26 feet. The result is that the nails have not held and the joists have shut together, the floors being deflected from 4 to 6 inches at the center. Still other cases have come under our notice, so that we are not prepared to advocate nailed trusses. The practical strength of nails is an unknown quantity, notwithstanding all the theoretical literature to the contrary.

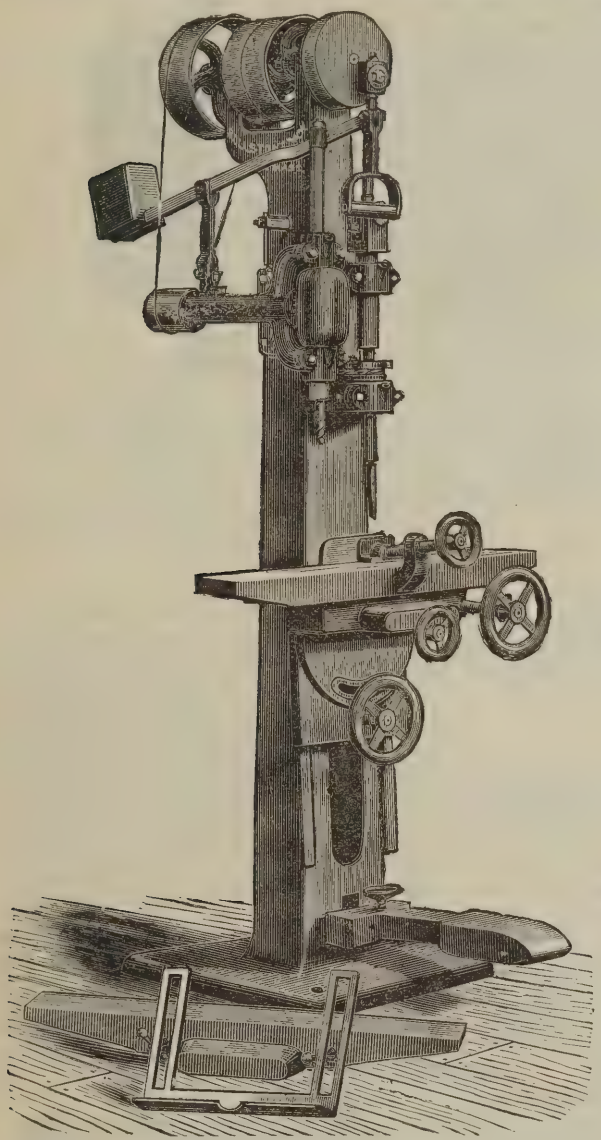
### Construction of Warm Houses.

*From* B. S. H., *Evansville, Wis.*—With reference to warm houses it is my opinion that we have nothing better or cheaper than paper, especially since it is offered so cheaply as at present, viz., less than 2 cents per pound. Under these conditions no one who builds should complain of a cold house. I use it on the outside of the sheeting-boards, under the siding; also on the roof under the shingles and under the floor. The first floor, which is used until the house is plastered, is laid with common dressed boards. On top of them is put the paper and over the paper the floor proper is laid. My method of putting paper between studding is to cut the strips in the center, which leaves it just the right width by bending each edge at right angles. To secure a dead air space I put on lath next to the sheeting-boards and put my paper back to this, holding it in place by lath nailed through the turned edges to the studding. The cold in our houses comes in by cracks in the floor and at the windows and doors. Sash to work easily must not work like a glove. In the West we use storm doors and storm windows—that is, double windows, with one light of glass hinged for ventilation. I frequently ask people why they try to make their houses air-tight elsewhere and leave such wind-holes at the doors and windows. I advise putting the needless expense of brickwork or back plastering in the cheaper and better material of paper and extra sash to the windows, to be removed in the spring time. Cut off all drafts of air between the upper and lower stories of the house, and my word for it the dwelling will be warm enough for comfort in the midst of a Dakota blizzard.

# NOVELTIES.

### Improved Power Mortiser.

The improved power mortiser is shown in Fig. 1. The frame is cast in one piece, strong and substantial, specially adapted for the various kinds of work such a machine would be called upon to do. The machine



*Novelties.—Fig. 1.—Improved Power Mortiser, Built by the Rollstone Machine Co., Fitchburg, Mass.*

is provided with two beds or tables, one plain and one compound, the work being clamped by means of a hand-wheel, rack and pinion, thus bringing any part of the work under the chisel. The table can be set to any angle in case any work demands it, and can be lowered to take 15 inches under chisel by means of a hand-wheel and screw. The top shaft is $1\frac{5}{16}$-inch diameter, and has outside bearings, with drive pulley for chisel 10 inches in diameter, 2-inch face, and should make about 450 revolutions per minute; the drive pulley for boring-shaft is 12 inches diameter, $4\frac{1}{2}$ inch face. The boring attachment is fixed to the side of machine, and can be left off when not wanted. The machine is furnished with $\frac{1}{4}$-inch, $\frac{3}{8}$-inch, $\frac{1}{2}$-inch, $\frac{5}{8}$-inch, $\frac{3}{4}$-inch chisels, and, if boring attachment is furnished, bits to suit chisels.

### Diamond Hack Saw.

Fig. 2 represents the Diamond Hack Saw, made by the Diamond Saw Co., 101 Milk street, Boston, whose factory is at Bridgeport, Conn., and New York office 33 Chambers street. The general features of the frame, with its device for giving tension and adjustment to the blade, are indicated in the cut. The end of the blade away from the handle is inserted in a steel pin or swivel, and thus is permitted to turn as desired, the regulation of the position of the blade being at the handle end of the frame. At the handle end the pin or swivel in which the blade is secured extends as a long screw into the handle, which is threaded to receive it, so that by screwing up the handle the blade is tightened or loosened, as desired. As indicated in the cut, there is a circular plate or washer between the handle and the frame through which this pin passes. In the inside of the opening in this plate or washer there is a spur or projection that fits into a groove running the entire length of the screw that enters the handle, so that both have to turn together, if at all. On the outside of the washer or plate notches are cut, into which fits a small pin or projection on the outside of the frame, thus keeping the plate, when pressed home, firmly in position and preventing its turning, and consequently at the same time holding the blade in position. The different notches permit the inclination of the blade at the desired angle, and with the device above referred to, by which the washer and the pin holding the blade are connected, it will be seen that a simple and effective adjustment is secured, while by screwing up the handle any desired tension can be obtained. It will thus be understood that in operating the blade is set in the position required, and the notch in the periphery of the washer passed over the pin on the frame, by which it is held at the proper angle, and the saw is then strained up to the required tension. An incidental advantage alluded to by the company resulting from this construction is that the long screw which runs some 3 inches into the handle, permits the use of broken blades. The company also lay special emphasis on the blades as being highly and evenly tempered, and direct special attention to the patent tooth. Instead of being made in the usual way, they are cut with a chisel and given an upset tooth. This is claimed to permit the cutting of soft metals without the liability of breaking off teeth, and the point is made that these blades are thus adapted to cut brass tubing, galvanized piping, &c., and are guaranteed not to bind. They cannot be filed, but can be replaced, it is intimated, at less than the cost of filing other saws. It is also claimed that they will outwear other blades. The hack-saw frames are made bronzed, 8, 9, 10 and 12 inch, and nickeled, 8, 10 and 12 inch. The blades are supplied separately, and are made the following lengths: 6, 7, 8, 9, 10, 11 and 12 inch.

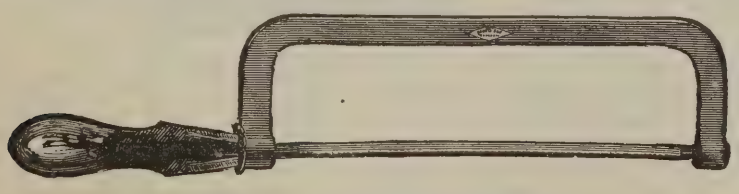


*Fig. 2.—The Diamond Hack Saw.*

### McClellan's Anti-Syphon Air-Inlet.

Dr. E. S. McClellan, of Paterson, N. J., has recently patented a device for admitting fresh air into the interior of waste-pipes at the moment the basin or other fixture is charged. He calls it an anti-syphon air-inlet. The device, which we illustrate by

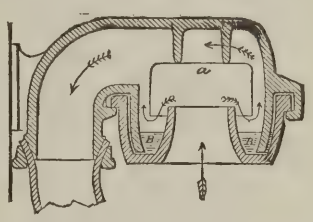


*Fig. 3.—Section Through McClellan's Anti-Syphon Air-Inlet.*

two engravings, one showing a general view and the other a sectional view, is simple, and is merely a plan to admit fresh air, while at the same time preventing any syphonic action and closing the orifice as soon as air is admitted by means of a simple mercury seal. The main portions of the inlet are made of cast iron of the shape clearly shown in the cut. There are three pieces, the first in the form of a cup with a tubular orifice, around which is a channel to contain enough

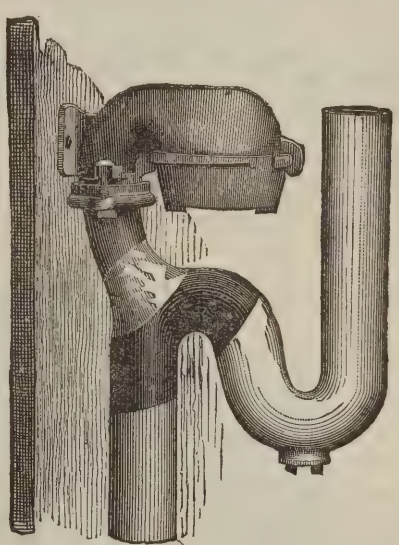


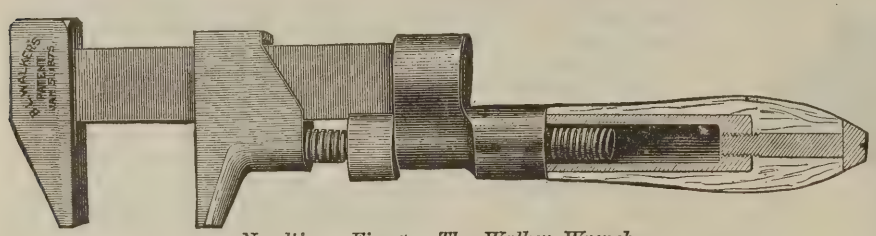
*Fig. 4.—McClellan's Anti-Syphon Air-Inlet.*

mercury to make a positive seal. Over the orifice and resting in the mercury is a light metal cup, which, when a partial vacuum is created by the discharging water in the waste-pipe, is lifted out of the mercury and admits a free flow of air into the pipe, but drops back into the trough of mercury the moment the demand for air ceases, and thus resists any back pressure. The mercury seal is capable of resisting a pressure of $\frac{1}{4}$ pound to the square inch, and is equal to a water seal 7 inches deep. The seal may be made to hold more mercury, but this is hardly necessary. The portion containing the mercury and cup fits with a bayonet joint over another casting, which is in turn attached to the spud soldered in the crown of the trap. This second portion also dips into the mercury, so as to make a gas-tight joint. The attachment is made by means of a collar and bolts, and when applied with red lead a permanent gas-tight joint is insured. Lugs are cast on the second piece, so that the whole can be screwed fast to a board, and thus made to

sustain the trap and the air-inlet firmly in place. In the sectional cut, Fig. 3, *a* represents the metal cup lifted out the mercury B by the rapidly inflowing air. The instant the inflow of air ceases the cup drops its edges into the mercury, and thus re-establishes the seal against any outflow from the waste-pipe. All the parts of this device are made rustless by the Bower-Barff process, which is a sufficient guarantee against corrosion. It is manufactured by the New York Sanitary Mfg. Co. The sales agents are Thomas Maddock & Son, 273 Pearl street, New York.

### Walker's Standard Wrenches.

The Walker Wrench Co., 90 Chambers street, New York, are putting on the market a new wrench, which is shown in the accompanying illustration, Fig. 5. It is named Walker's Standard Wrench, and in connection with it are pipe attachments and a pipe cutter. The form of the wrench is indicated in the illustration, with some of its special features. In alluding to it the manufacturers call attention to the fact that these wrenches are more uniformly in proportion for excessive strain and have larger openings than others, a 12-inch wrench having an opening equal to 15-inch of other makes. They make the point also that the cross strain is very light, the tension or pull coming directly in line with the bearing, while the offset in the handle gives addi-



*Novelties.—Fig. 5.—The Walker Wrench.*

tional leverage and does away with the danger attending the top pull with other wrenches now in use. These wrenches are made bright and black, in 6, 8, 10, 12 and 15 inch sizes, and are put on the market with special claims as to quality in the confidence that they meet the demand of the trade for a superior article of this character. In connection with the wrench is the pipe

*Fig. 6.—Pipe Attachment.*

attachment shown in Fig. 6, made, as indicated, of two pieces, and readily applied. This attachment is described as made of the best steel, as not liable to cut the pipe, as coming cheaper than any combined tool in the market, and as being adjustable from nothing to the extent of the opening of the jaws of the wrench. The principle of the attachment is that the bevel

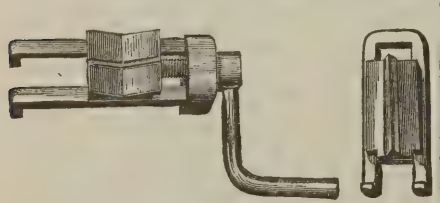


*Fig. 7.—Pipe-Cutter Attachment.*

runs one way and the teeth the other, making a fulcrum of the jaw. It is made in 10, 12, 15, 18, 21, 24 and 30 inch sizes. The pipe cutter is illustrated in Fig. 7. In this attachment the cutter, being bevel with the pipe, cuts through it, instead of the old style of the crushing strain. It leaves no burr to be filed down, but instead a beveled edge on the pipe, which is alluded to as assisting the workman in threading, and it is stated that the cutter will cut within $\frac{1}{16}$ inch of the edge. The wrench and pipe attachment are already on the marker, and the pipe-cutter attachment will be in a very short time.

### Novelties in Wood-Working Machinery.

The Glen Cove Machine Co., Limited, with office and works at Nos. 28 and 30 Clay street, Brooklyn, are introducing several novelties in wood-working machinery which are of interest to planing-mill managers and wood-workers in general. We risk very little in saying that their machines present more new and original features than almost any others to which our attention has been called for some time past. Among the special improvements we may mention what is described as their cone feed works, which is applicable to fast-feed planing and matching machines. This improvement affords a positive method of varying the feed upon planing and molding machines from slow to fast, and can be effected while the machine is in motion. If desired the feed may be changed a number of times while a single board is passing through the machine. The operator has the machine under such control that he can always secure a smooth cut over knots and bad places by slowing up when he comes to them and speeding up again when they are passed. Another improvement is the means by which the front end of the planing and matching machines, molding machines, &c., may be thrown open, thus exposing the head in a manner most convenient for the operator to get at it for the purpose of setting or sharpening the knives. This is accomplished by swinging the front of the machine to one side, so that it can be readily put out of the way whenever attention to the knives is necessary. The improvement makes it possible to do beading or rabbeting on the under side of a board with facility. The operator can run his board into the front of the machine by swinging the end open, and can set the knives easily, quickly and correctly the first time. Guides are provided upon each side of the under cutter-head for the purpose of securing a straight cut. Another improvement which this company are introducing is a weighted chip breaker and side spindles. The company have also brought out a patent adjustable saw-bench, in which either a cut-off saw or a splitting saw may be brought into use at will. The change from one saw to the other is made by raising a lever handle. Fine adjustments are accomplished by a special gauge, and the machine is provided with paper pulleys and other features of construction insuring good results. The illustration presented, Fig. 8, is another of the useful improvements which this company are introducing. The cut represents a novel method of fastening the heads to the side spindles of planing and matching machines, and which does away with the old-style set-screw. The illustration shows the nature of the device so thoroughly that very little description is necessary. When the head has been accurately adjusted to position a turn of the vertical-screw, the lower end of which is beveled and bears against the beveled end of a horizontal steel pin, forces the pin against the spindle in a way that secures a firm grip without any possibility of shifting the adjustment of the head, and without any chance of its working loose until the screw is turned back again. This improvement, like many other

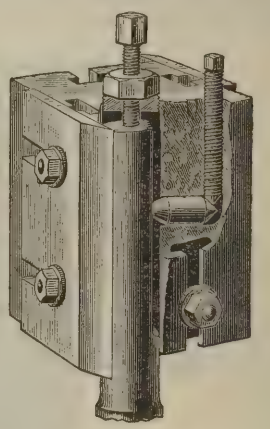


*Fig. 8.—Method of Fastening Heads to Side Spindles in Planing Machines, &c.*

good things, is exceeding simple and will be readily appreciated by all who are using wood-working machinery.

### Palmer's Pivot Slat Blind.

The Palmer Mfg. Co., of Troy, N. Y., are offering to the trade a pivot slat for blinds, the general nature of which will be understood by inspection of Fig. 9. This is a new article and has recently been patented. Among the advantages to which the makers direct attention are that the slats cannot rattle and cannot be cemented fast by paint. The construction is such that the slats remain in any desired position. No slat holders are required, and there is no noise caused by wind playing on loose slats. The company are offering pivot slats embodying this improvement, and in their circular direct attention to the fact that, the factory price of blinds being only a fraction of their cost when ready for use, it is doubtful economy to buy other than the best that can be made, since repairs alone soon double the cost of

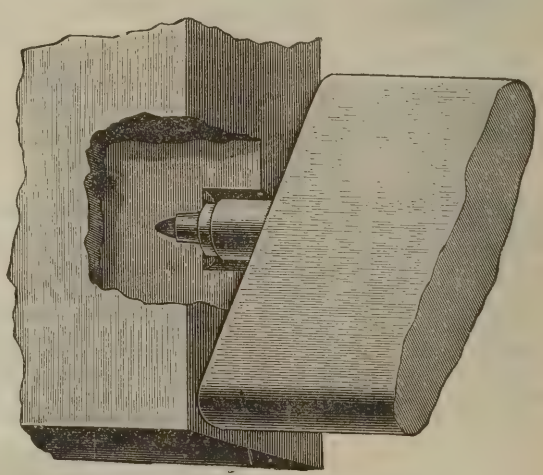


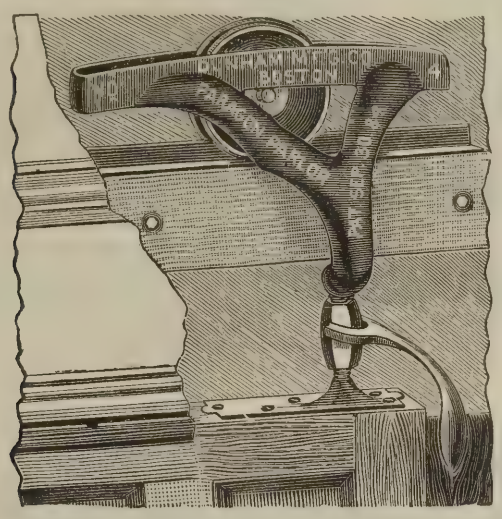
*Fig. 9.—Palmer's Pivot Slat for Blinds.*

the old style. Referring to the illustration, the only bearing surface, it will be seen, is on the small central pivot, which is forced into the hole made by the feed-screw of the bit used in boring the stiles. The pivot is made so large as to considerably increase the size of the screw-hole, and at the same time is compressed much smaller than its original size, making the small pivot fit its socket as a cork fits a bottle. By this means ample friction is secured to control the movements of the slats to prevent rattling and effectually exclude paint. The yielding properties of wood so compressed insures a continuance

of perfect action under all conditions, and makes a hard polished bearing that long use will not impair.

### The Paragon Anti-Friction Door Hanger.

The illustrations which are given herewith, Figs. 10 and 11, represent respectively the Parlor Hanger No. 4 and the Warehouse Hanger Nos. 1, 2 and 3, which are made by the Dunham Mfg. Co., Boston, Mass., for whom Lauderback, Gilbert & Co., 33 Chambers street, New York, are agents. In putting these hangers on the market the manufacturers allude to the demand for a cheaper, stronger and better appliance for operating sliding doors, which they trust is met in the Paragon. They direct attention to the fact that these hangers are manufactured on new, scientific and economical principles, in one solid piece, from air furnace refined malleable iron, with no bolts or rivets to wear and work loose, giving them, it is claimed, exceptional strength. Their Parlor Hanger No. 4, represented in Fig. 10, is described as all made of malleable iron, nickel-plated, with their patent fiber Bessemer axle noiseless running wheel, on a polished steel track. It will be observed that the wheel runs on its periphery and that there is a slight curve in the rider bar. The method by which the hanger is adjusted is also indicated, giving, it will be seen, a fine and simple adjustment. Its noiselessness in running is also alluded to. The warehouse hanger, shown in Fig. 11, is made in three sizes, Nos. 1, 2 and 3, No. 1 being for door to run from 3 to 6 feet, No. 2 for door to run from 6 to 12 feet, and No. 3 for door to run from 12 to 20 feet. In addition to the advantages above alluded to, the following points are made in favor of the Paragon hanger: That it is easily operated, impossible to derail and never requires lubricating; that it is simple in construction and will fit any door, new or old; that it is the only hanger that uses a polished steel track, and that it is exceptionally handsome and well finished. And in regard to the parlor hangers the points are made that they are absolutely noiseless, never require lubricating, that the door is easily adjusted should the building settle, and that with its use the parlor doors will close dust-proof without cutting, wearing or chafing carpets.




*Novelties.—Fig. 10.—The Paragon Anti-Friction Door Hanger Arranged for Parlor Doors.*

*Fig. 11.—Paragon Warehouse Hanger.*

### Improved Automatic Lathe.

We illustrate in the annexed cut, Fig. 12, a new automatic wood lathe with back knife attachment for turning all kinds of chair, furniture and similar fancy or beaded work. As the engraving shows, the machine is designed with due regard to strength, durability and fine proportion, and it is claimed to be the outcome of long experience on this class of work. The arbors, centers, feed-screw, &c., are of steel, and the bearings are extra long and carefully scraped and tested before shipping. The main turning chisels are adjustable by patented devices, so as to be set absolutely accurate as to diameter of cut without stopping the lathe, and the shaping chisel is raised automatically from the form on the return of the carriage. The pattern-knife gate is fitted in rigid slides, and is counterbalanced at both ends so as to move freely without cramping. All adjustments are provided that are necessary for setting the pattern knives and other parts. One of the important features of the lathe is the intermediate knife-bed, which is hinged to the main slide and secured rigidly by bolts as well. By removing the bolts the bed may be swung over backward and the

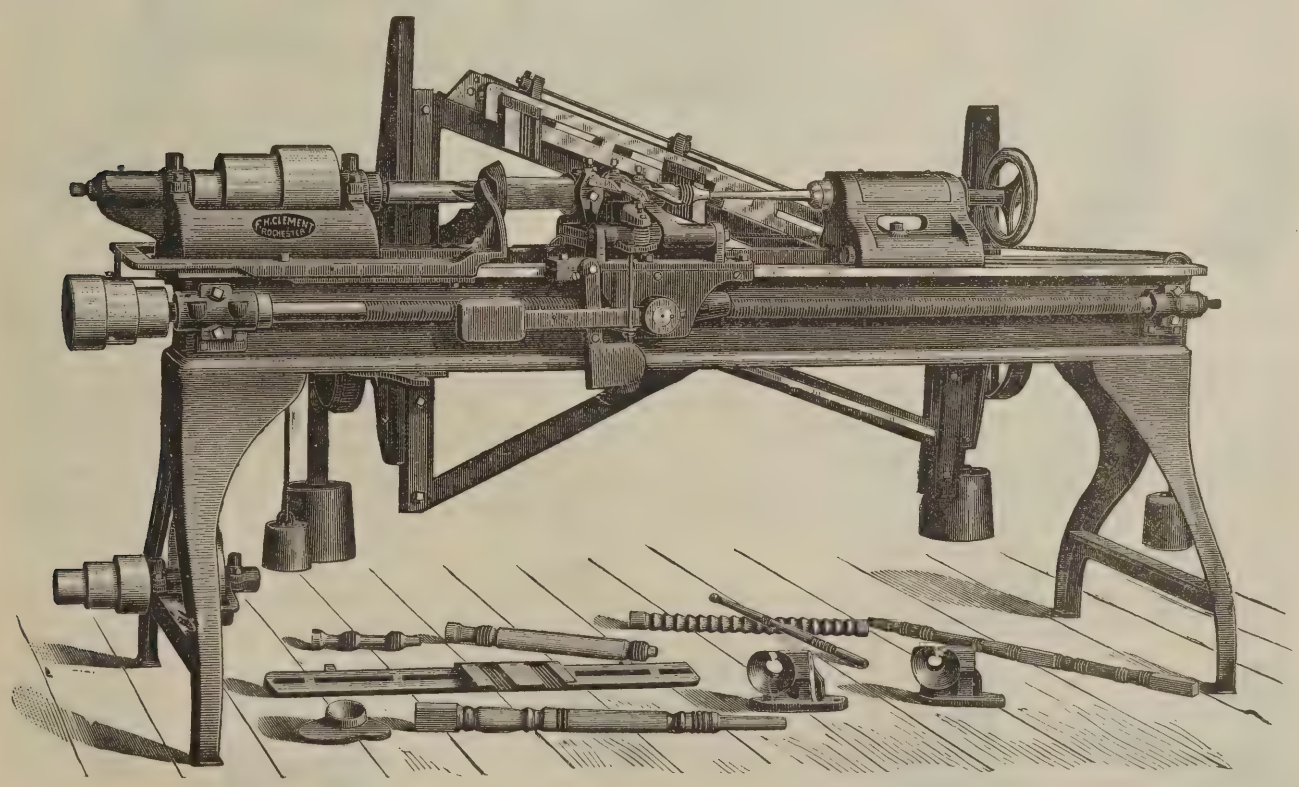
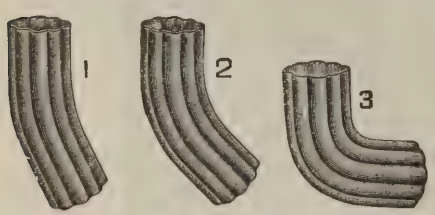



*Fig. 12.—Improved Automatic Lathe, Built by F. H. Clement, Rochester, N. Y.*

knives sharpened and returned to working position without adjustment. Another advantage of this construction is that when knives are changed they may be left attached to the bed and the whole removed from the lathe and another bed and knife put in place in a few minutes without any loss of time. In adjusting or setting the knife to cut right this device is especially valuable in shops where it is necessary to change from one pattern to another frequently. All the parts are carefully fitted and every lathe is tested on some pattern before leaving the factory. Two sizes of these tools are made. Frank H. Clement, 131 Mill street, Rochester, N Y., is the builder.

### New Conductor Fittings.

Several new articles of the general nature of conductor fittings (Figs. 13 to 16) are being offered to the trade by Lamb & Ritchie, of Cambridgeport, Mass. Among these are




*Novelties.—Fig. 13.—Ritchie's Stamped Corrugated Elbows.*

stamped corrugated elbows and shoes, illustrations of which are presented in the accompanying engravings. Both elbows and shoes are made of different angles and are stamped up in a way to give these parts the same characteristics as the pipe to which they are fitted. The makers recommend them as perfect in curve and entirely free from soldered joints. We have examined samples of these goods and find the quality of the workmanship very satisfactory in every particular. The engravings are fair representations of the goods. Another novelty is Hall's Adjustable Conductor Fastener, which we illustrate by two engravings. Two styles of this fastener are

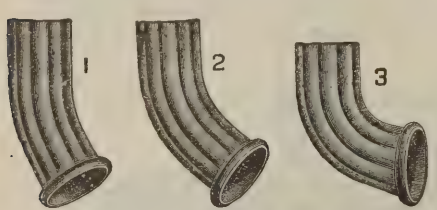



*Fig. 14. Ritchie's Stamped Corrugated Shoes.*

manufactured, one being for driving into the brick or stone wall and the other for screwing against woodwork. The spike-head is made of malleable iron, tinned. The cleat B, which is made of heavy tin, and can be used on any kind of pipe, is soldered in place. It is provided with a number of holes, thus making minute adjustment possible. It is as well adapted to square pipe as round corrugated pipe. The second style differs from the first only in the matter of the wall plate. A copper pin is used for fastening the cleat in the

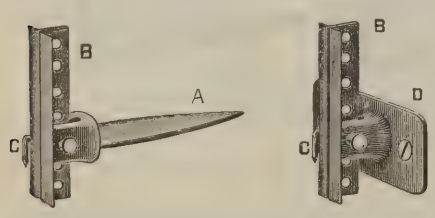



*Fig. 15.—Hall's Adjustable Conductor Pipe Fasteners.*

spike or wall plate, as the case may be. Fig. 16 represents Ritchie's Conductor Head, one view showing the head alone and the other showing it slipped into a corrugated conductor-pipe. One of advantages to which the makers direct attention is that no solder is needed in the use of this fitting. The question of a satisfactory connection between the gutter and

*Fig. 16.—Ritchie's Conductor Head.*

corrugated pipe is one that has troubled many mechanics, and this device would seem to be a satisfactory solution of the difficulty.

### Combination Miter Cut-Off and Splitting Saw.

C. B. Rogers & Co., of Norwich, Conn., are directing attention to a combination miter cut-off saw with tilting top, which is

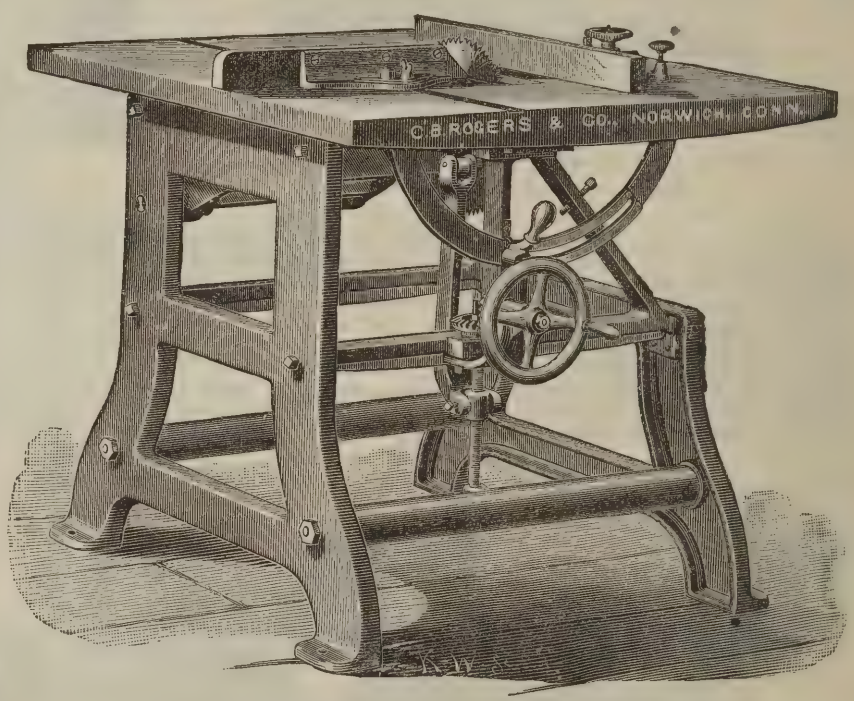



*Fig. 17.—Combination Miter Cut Off and Splitting Saw.*

illustrated in Fig. 17 of the engravings. They claim that it is one of the handiest and most useful tools on the market. It is made throughout of steel and iron and is put together in the most thorough manner. The table, which is planed true, measures 3 by 3 feet 3 inches, and is arranged to tip to any angle up to 45°. It is also provided with a splitting-gauge and two cut-off gauges for common or miter work. The saw arbor is adapted to a yoke that swings on a shaft at the back of the machine and is raised and lowered by means of a screw and hand-wheel, situated so as to be convenient to the hand of the operator. The tilting device is also conveniently arranged, and all necessary adjustments are made from the front of the machine. The table is calculated to carry 14-inch saws. The diameter of the saw mandrel is 1 inch. A counter-shaft, with 14-inch hangers, is used with the machine, and in mounting is placed 5 feet from the center of the saw arbor. The weight of the machine is about 825 pounds, and 2 to 3 horse-power are required to drive it.

### Improved Carpenters' Gauges.

In the very common use made of a marking-gauge by wood-workers and in the simple construction of its parts may perhaps be found cause for the notable lack there has been in improvements on this tool. We illustrate on this page, Fig. 18, one improvement which considerably enlarges the scope of the ordinary marking-gauge by enabling the owner to run a gauge line with perfect steadiness and accuracy around curves of any degree, and either concave or convex. A metallic face-plate with two ribs or projections is secured to one side of the gauge-bead, and when this side of the bead is in use the two ribs will both have a bearing on the edge of the work in hand, and, being circular in their form, the ribs will adapt themselves to any curve, even down to that of a 3-inch circle. For ordinary straight lines the gauge-bead may be turned around on the bar, though this is not necessary, as the two ribs on the face-plate are both of the same size and present a parallel bearing for all straight work. Other improvements in gauges, as shown in the illustration, are the insertion of a brass shoe under the thumb-screw, thus protecting the gauge-bar from being dented by the action of the screw, and the substituting of a tempered-

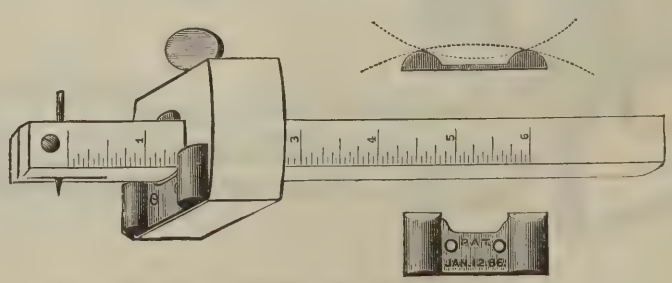
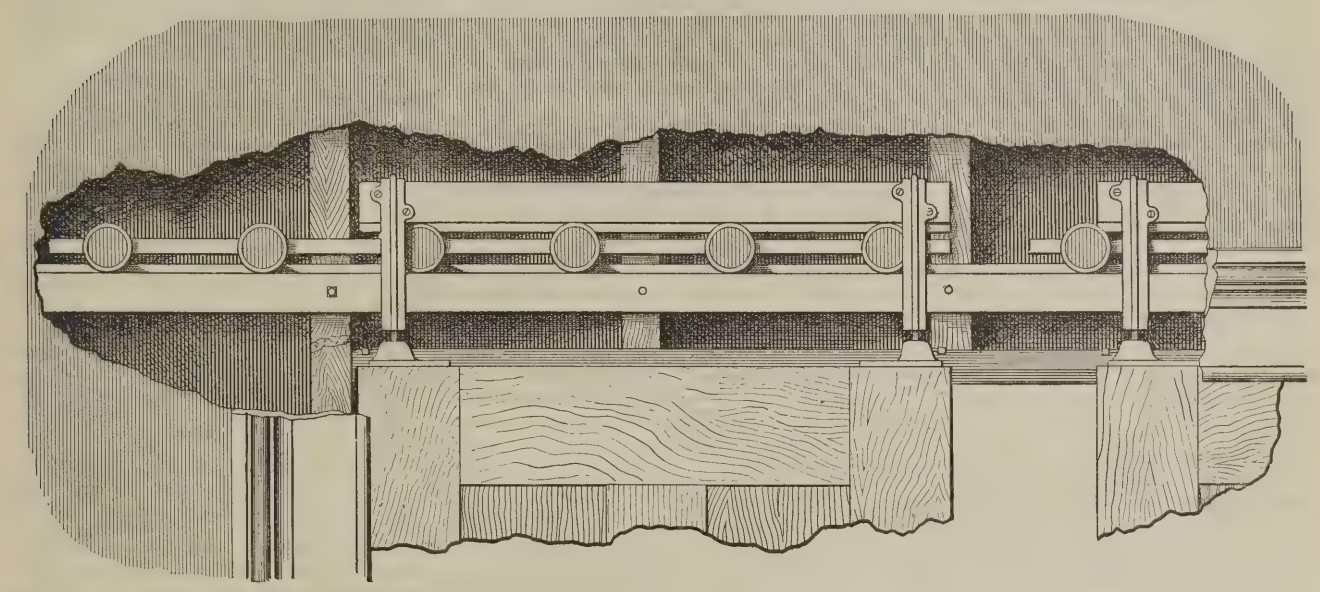



*Fig. 18.—Improvement in Carpenters' Gauges.*

steel point which can be moved down as it wears, or can be easily removed and replaced for sharpening or for repairs. These improvements have been made by the Stanley Rule and Level Co., of New Britain, Conn., and are attached to their line of gauges, which are sold by hardware dealers generally.

### The Emerson Door Hanger.

In Fig. 19 we show a new form of door hanger which is being introduced to the trade by Emerson, Baldwin & Co., Syracuse, N. Y. By inspection of the engraving it will be seen that the hanger is anti-friction in its features. A number of pulleys or wheels are employed which run over a rail having a tongue or bead through its center. The pulleys are double or grooved. The space between them corresponds to the thickness of the tongue on the rail which we have mentioned. The door is hung to a second rail which rides on the pulleys or wheels at the top. The tongue, which in this case projects downwardly between the two surfaces, is shown in the sectional view. The pulleys or wheels are yoked together by a narrow strip of wood which is notched so as to set over the axles and keep them in proper relationship to each other. The entire construction is such as to reduce friction to a minimum. Among the advantages claimed for this construction, the features of which are clearly shown in Figs. 19 and 20 of the engravings, are that the doors are easily detachable and can be taken off in a moment without removing a screw and without taking off the casing. This is accomplished by simply lifting the door up a very slight distance and then moving it outward. The door hangs by button-headed pins which the lifting, as above described, allows to be slipped outward. The space required for putting up this form of hanger is the same as the thickness of the door, with the usual allowance for play. The vertical hight required is from 8 to 10 inches. Parlor doors are hung above the center of their thickness, and the iron suspenders upon which the doors are hung are not discernible when the doors are in place. The slot in which they move is very nearly concealed by the bottom casing. While there is very little possibility of these hangers getting out of order, they are easily accessible by removing the pocket on the under side, as shown in the cut. The construction is such as reduces noise to a minimum. The doors hung by this device are capable of fine adjustments by means of the adjuster shown in Fig. 21. This has the advantage of simplicity of parts, and is easy of attachment. It is fastened by screws put in on a slant. The makers of this hanger inform us that it has been selected for use in the Garfield Monument now in process of erection in Cleveland.



*Novelties.—Fig. 19.—The Emerson Door Hanger.—Emerson, Baldwin & Co., Syracuse, N. Y.*

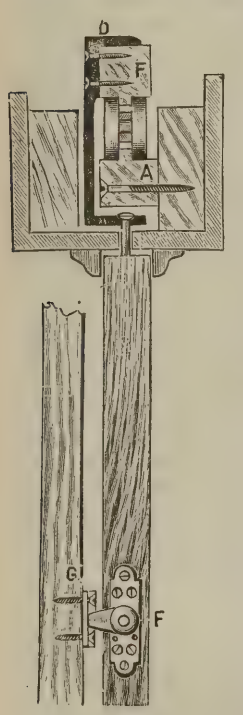



*Fig. 20.—Vertical Section Through Emerson Hanger.*

### Dry-Rot in Timber.

In one of our German exchanges the question of dry-rot is treated in the light of a summary of known facts illustrative of the subject. The writer is of the opinion that the problem of dry-rot is still to be solved, and, in view of the occurrence of dry-rot under some very peculiar conditions, suggests that the germs of the disease may exist in the living tree. In no other way can he explain the decay of wood from this cause when it was apparently dry and sound and properly used. In Russia there are entire forests from which no timber is now taken, experience having shown that it has always been attacked by dry-rot. Sometimes a strong solution of common salt, applied while hot, has been found an efficient preservative of timber. The necessity of airing timber in its built-in position is, of course, universally recognized. Professor Farsky, of Tarbor, Bohemia, has found that salicylic acid is a preventive and cure for dry-rot. At first the acid was used in a dry form, but latterly great success has been achieved with a solution of $\frac{5}{28}$ ounce of salicylic acid in 0.22 gallon of alcohol, and afterward diluted. This solution has efficiently protected a floor 800 square feet in area from the spread of dry-rot, and has removed it from the spots where it seemed to have established itself. The crude acid may be used for this purpose, and its action as an antiseptic is hightened by the admixture of a little carbolic acid. Professor Poleck finds that wood cut in winter and not soaked in water is very susceptible to dry-rot, which does not appear when the timber is kept perfectly dry or thoroughly wet. A somewhat high temperature and dampness are almost, though not entirely, essential to the propagation of the dry-rot mycele. It is in contemplation to determine by experiment whether timber cut in summer cannot be rendered safe against dry-rot by the removal of the bark, protracted drying and prolonged steeping in water.

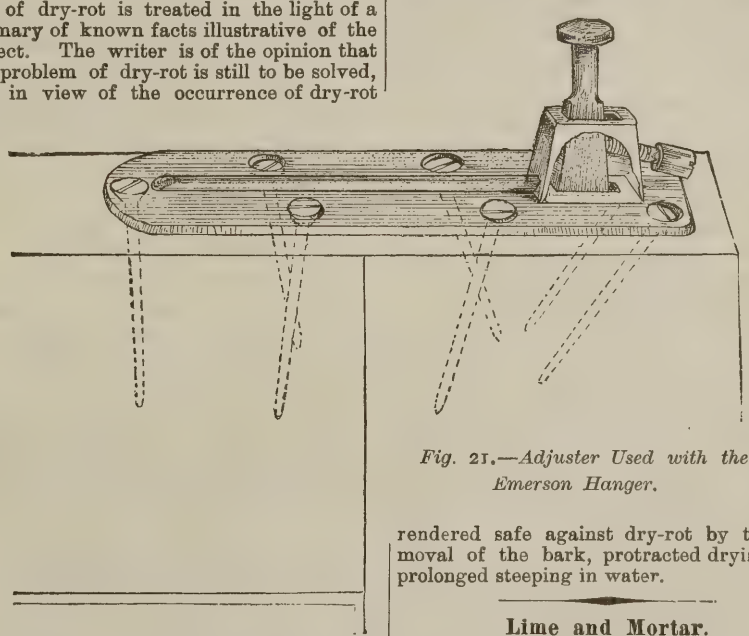


*Fig. 21.—Adjuster Used with the Emerson Hanger.*

### Lime and Mortar.

The first use of lime and mortar in masonry, according to J. H. Parker, is a very doubtful question, and in early massive walls it is often difficult to distinguish whether there is lime mortar or not. Clay was sometimes used as cement, and the filtration of water through the tufa often gives the appearance of lime mortar when there is not really any. There is certainly none in the walls of the first period of Roma Quadrata, on the Palatine. In the second period the fine jointing makes it difficult to see whether there is mortar or not, but it would hardly be required. Herodotus mentions lime as used before mortar, though concrete walls may have been of any period after lime mortar was once introduced, and they generally form the mass of all Roman walls. What Vitruvius calls construction means the visible construction, the surface of the wall only, and most writers follow him in this respect: but massive concrete

walls are what really supported the vaults and the roofs before buttresses were introduced, and these walls are often built hollow to prevent the moisture from passing through them.

### Architectural Orders.

In writing on the subject of orders for architecture Mr. A. Alison says: "Every order consists of three parts or divisions: the base, the column and the entablature; and the governing proportions relate to this division. The whole of them compose the wall or what answers to the wall of a common building, and supports the roof. There is one great difference, however, to be observed between a common wall and that assemblage of parts which constitutes an order. A common wall is intended to support a roof, and derives its proportions in a great measure from this destination. To an order the consideration of the roof is unnecessary. It is complete without any roof, and where a roof is necessary it is generally so contrived as not to appear. The weight which is supported, or which appears to be supported, in an order is the entablature. The fitness of a wall consists in its appearing adequate to the support of the roof. The fitness of an order, or of the proportions of an order, it should seem also from analogy reasonable to conclude, consists in their appearing adequate to the support of the entablature or of the weight which is imposed upon them. That this is really the case, and that it is from their being expressive to us of this fitness that the proportions of these different orders appear beautiful, may perhaps seem probable from the following considerations. The appearance of these proportions themselves seems very naturally to lead us to this conclusion. In all the orders the fitness of the parts to the support of the peculiar weight or appearance of weight in the entablature is apparent to every person, and constitutes an undoubted part of the pleasure we receive from them. In the Tuscan, where the entablature is heavier than in the rest, the column and base are proportionately stronger. In the Corinthian, where the entablature is lightest, the column and base are proportionably slighter. In the Doric and Ionic, which are between these extremes, the forms of the column and base are in the same manner proportioned to the reciprocal weights of their entablatures, being neither so strong as the one nor so slight as the other. If the beauty of such proportions is altogether independent of fitness, and derived from the immediate constitution of our nature, it is difficult to account for this coincidence; and as the beauty of fitness in these several cases is universally allowed, it is altogether unphilosophical to substitute other causes of the same effect, until the insufficiency of this cause is clearly pointed out. The language of mankind upon this subject seems to confirm the same opinion. Whenever we either speak or think of the porportions of these different orders, the circumstances of weight and support enter both into our consideration and our expression. The term 'proportion' in its general acceptation implies them, and, if this term is not used, the same idea and the same pleasure may be communicated by terms expressive of fitness for the support of weight."

### Lacquering and Finishing Woods.

A writer in *The Decorator* presents the following remarks with reference to wood finishing and lacquering: "The proper finishing of wood is a matter of the utmost importance to the furniture and cabinet maker. The proper treatment of the wood itself has much to do with perfect finishing, for the finishing will be unsatisfactory if the wood used has been cut without reference to direction of grain and that of shrinkage of the fiber, which is at right angles with radial medullary rays. As shrinkage is from the surface inward, the proper plan is to saw from circumference to center. With a straight grain thus insured, the surface is always correct as to the direction of medullary rays, and the work of finishing is facilitated, and in the end the articles are more enduring. Owing to the severe test of extremes of temperature in this country, Europern furniture in which the above points have been disregarded is strongly inclined to warp. Formerly our styles of furniture were too greatly influenced by the peculiarities and capacities of the wood-molding machines, and thus beauty was sacrificed; but we are moving in very much the same direction as in French fashions of furniture, which have long been regarded as the perfection of art.

"There is much yet to be learned as to the finishing of woods in the way of varnishing. Gum copal—very satisfactory in appearance, and often applied to finish the best work on pianos—is easily ruined by atmospheric and other influences. The Japanese succeed admirably in applying a varnishing lacquer that has no fragility. We are enabled to give the process: If the wood to be varnished is very porous, the pores are filled with a mixture of stone powder and the lacquer, called *seshime*, which is merely the sap of the varnish-tree. This paste is spread over and pressed hard upon the wood with a wooden spatula. When the polish is well hardened, the surface is polished with a soft stone, so that the veins of the wood come out again. The filling process is repeated if necessary. Next, in order to give it a color, the wood is painted over with a thin water color, or it is stained. Thus prepared the wood is varnished with one thin coating of the lacquer *shionkei*, a lacquer that rapidly hardens, and in hardening takes a gloss. If the wood is close-grained the preliminary work is unnecessary, and the *seshime* lacquer is alone rubbed into the wood with a ball of cotton. After it has been rubbed in the surface is rubbed with Japanese soft paper, so that, in fact, only a very thin layer remains. If the Japanese lacquer does not spread evenly, owing to thickness, it is mixed with stone powder, powdered camphor being added to the varnish, so as to enable it to flow more easily. There is one thing about the Japanese method of using varnish that is worth knowing, and that is that the atmosphere in which it is to harden is made moist and the room darkened. For moisture the lacquered surfaces are placed in boxes wetted with damp towels. It generally requires 48 hours to harden the lacquer."

## TRADE NOTES

TALLMAN & MCFADDEN, No. 1025 Market street, Philadelphia, announce a new catalogue of carpenters' tools, to be ready about July 1. This new book will contain reduced prices in various lines.

F. R. MCLAUGHLIN, auditor of Logan County, with office at Bellefontaine, Ohio, is advertising for sealed proposals on the Children's Home to be erected in that county. The letting closes at noon, July 8.

BARLOW BROS., of Grand Rapids, Mich., are directing the attention of shippers to a manifold shipping blank which they are supplying. Sample sheets are sent on application.

THE ABRAM COX STOVE CO., of Philadelphia and Chicago, invite builders to send for their pamphlets relating to heating apparatus. They manufacture a number of specialties that may be described as heating engineers' supplies.

SUTPHEN & CO., of New York, is the style of a new firm importing and dealing in polished and rough plate glass. Their office and warerooms are at 18 Desbrosses street. They make a speciality of glass for store fronts, and also of small sizes of polished plate.

IT SOMETIMES HAPPENS that a disaster is turned to great advantage in the conduct of a manufacturing establishment. For example, the Union Furniture Co., of Batesville, Ind., were burned out some six months since. Instead of submitting to fate, as some might have done, the directors held a meeting and decided to rebuild at once and to do it upon a scale that would insure a model factory, and one that should contain the very best machines that could be found. The Egan Co., of Cincinnati, pride themselves on the fact that their machinery was selected for the purpose. They claim that the new factory of the company above named is equal, if not superior, to any other in the United States in the matter of equipment and of general appointments.

BERRY BROS., varnish manufacturers of Detroit, Mich., announce a change in location of their New York office and warerooms. They have removed from 96 John street to 252 Pearl street. Mr. Alfred Hooper is the manager of the New York branch.

CATALOGUE D of the Hanika Iron Fence Co., Springfield, Ohio, which has recently been issued, explains the construction of the Hanika iron fence, and illustrates a number of designs of fences, gates, vault doors, crestings, &c. A number of designs for finials and weather vanes are also included, likewise tower ornaments and stable fittings. The catalogue is of interest to all who have such work in charge.

WE HAVE RECEIVED from the Wells Rustless Iron Works, No. 9 Cliff street, New York City, a catalogue and price list of iron goods treated by the Bower-Barff prccess. Prominent among the lines of goods described is rustless iron water-pipe, which is largely employed at the present time in the plumbing of first-class dwellings. Artesian-well tubing is also described and likewise drive-well pipe. A description of the process and numerous testimonials from those who have employed the material are presented. The pamphlet is of interest to all who have occasion to use material of this kind.

CATALOGUE No. 3 of builders' hardware, issued by Chas. A. Strelinger & Co., of Detroit, Mich., measures 8½ x 12 inches, and is bound in cloth, with a gilt side title. It contains upward of 300 pages, is printed in colored ink, and is profusely illustrated with wood-cuts showing almost every article, both staple and special, that a builder is likely to employ about a house. It is supplemented by an alphabetical index, which alone occupies eight pages, that render reference to any part of the book easily and quickly made. A price list is sent with the book, refering to it by pages and so arranged as to be convenient for reference. A page of bronzework is introduced near the begining of the book, showing the approximate color of standard bronze-metal goods. Three styles of finish are thus illustrated. From the introductory we learn that the stock of this firm is both varied and complete, and that it is maintained by constant communication with the makers, and is supplied with all the saleable novelties as fast as they make their appearance. A point is made that nothing but the best manufactured articles and such as can be recommended for quality and workmanship are carried in stock. Customers are assured that whether prices are quoted or not all orders received will be filled at the very lowest market rates. The catalogue is one of the most complete that has been issued for builders' use. Directions for orders are given, and the "hand" of locks, latches and butts is discussed, with illustrative diagrams. The means of measuring the bevel of doors in order to obtain hardware to fit is also illustrated and explained.

THE HANIKA IRON FENCE CO., of Springfield, Ohio, have issued an oblong pamphlet containing a description of saw and file proof jail and station-house work, which they manufacture. The first illustration in the pamphlet shows how easy an expert jail-breaker can secure freedom from the old-style iron jail. Following are illustrations of modern jailwork made from chrome steel, which is saw and file proof. Illustrations of cells employing different features of construction are shown near the end of the book; also a plan of a small jail room. The catalogue is of special interest to all who have anything to do with jail or station-house work.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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## NOTES AND COMMENTS.

CONTINUING the train of thought which has characterized our review of the situation in the building trades for several months past, the outlook at the present time may be likened to the period immediately succeeding a storm. The sun has broken through the clouds, people are returning to their usual avocations, and the business world is once more astir. The lethargy and inactivity caused by the labor difficulties have disappeared, and business in various lines is in much better condition than a very short time since. As a rule the 10-hour plan of work has been resumed. The building business is very active in some directions and is fairly good in all parts of the country. At the same time it must be admitted that less is being done the present season than would have been done had we escaped the unfortunate complications of the spring.

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THERE seems to be a general feeling in trade circles that unless something now unforeseen shall happen there will be a gradual and sustained improvement in business until the end of the year, and that next year will be one of general prosperity for all departments of productive and distributive industry. Of course it is in the power of organized labor to blight this fair promise and to maintain for an indefinite period the uncertainty and distrust which always lead to stagnation and depression, even when the general condition of the country is such as to favor prosperity. Experience has shown that the country is never prosperous when the wheels of industry are blocked. It is then and only then that the country suffers from what is called overproduction. The true remedy for this condition of congestion is found in increased production. It is when the labor of the country is fully employed and the wage-earning classes are consuming freely that stocks quickly disappear and manufacturers find it difficult to keep up with their orders. This may seem paradoxical, but it is not. The wage-earning classes are always the largest consumers of all forms of staple commodities. As compared with farmers they are very liberal and even reckless consumers. A single manufacturing town will, under normal conditions, consume a much greater variety and value of manufactured products of all kinds than are needed to meet the requirements of a country containing a large population depending upon agriculture. Wage-earners spend their money freely, and live as well as their means permit; farmers are, as the rule, close, careful and economical buyers. Statisticians properly attach great significance to the crop prospects and the condition of the farming communities; but the immediate future of trade depends on the condition of the wage-earning classes and the extent to which the labor of the country is employed. It involves no contradiction, therefore, to say that the remedy for the state of congestion which we call overproduction is found in increased production. It is impossible to fill a tank by pumping into it when the pumps are supplied by suction-pipes connecting with it; but if the outlets are closed an invisible stream will in time overflow it. If organized labor will refrain from stopping production we may confidently predict a more than proportionate increase of consumption.

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A SANITARY CONVENTION is to be held at Coldwater, Mich., under the auspices of the Michigan State Board of Health, on the 24th and 25th of next September. The prospectus is at hand. From it we learn that at each session of the convention there will be addresses or papers on subjects of general interest pertaining to public health, each paper to be followed by a discussion of the subject treated. The admission to all sessions of this convention will be free, and the ladies are cordially invited. The invitation is especially extended to health officers to be present and take part in the discussions. The objects of the convention are the presentation of facts, the comparison of views and the discussion of methods relating to the prevention of sickness and deaths, and the improvement of the conditions of living. The prospectus contains a list of some of the subjects which are to be presented and discussed. Authors of papers are requested to limit them to 20 minutes. The speakers who lead the discussions are to be allowed 10 minutes each; all others 5 minutes. The papers are expected to be original contributions, which when read are to be considered the property of the convention and to be left with the secretary.

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MANY OF OUR readers have scoffed at Queen Anne cottages, and many others have attempted to build cottages of this kind for themselves or their customers, in the belief that such buildings were comfortable, convenient and well adapted to the needs of this country and the times in which we live. Many have been the disappointments which have resulted from such experiments. Apart from the picturesque appearance of these buildings and their supposed popularity there is comparatively little to recommend them. In an illustrated paper on American country dwellings, published in a recent number of the *Century*, there were some remarks on the disadvantage of the Queen Anne cottage with which many of our readers will express sympathy. The author writes as follows: "But why is not the Queen Anne cottage—which in its best state at home has charmed the eye of many an American and thoroughly fulfilled his conception of what a country home should be—why is it not able, if transplanted to our own soil, to meet at least a certain class of needs? Try to live in one, and you will see. In the winter season you will have snow where the Englishman has rain, and will find his picturesquely complex roof a snow-trap, not a snow shed. You will have far greater cold than he, and will need a plan that does not put too many difficulties in the way of warming from a common center. Winter and summer you will have sunshine of a strength he knows only in his dreams, and his house will very likely give you more windows than you want. And in summer you will have heat of a potency he would hate to know even in his dreams, and his house will most certainly not give you the thing you want most of all--a piazza. And, again, you will very often wish to make a much more extensive use of wood than he ever makes in these modern days. Of course you may use your wood in place of his brick; you may modify his roofs, change his plan, alter his openings, and add your own piazza. If, however, you do this with the intent to copy the effect of his house as nearly as you can, you will utterly spoil his creation and produce a bastard thing which will neither satisfy your eye nor wholly meet your needs. And this is just what has been done in a very great many cases. If, on the other hand, you make the necessary changes with intelligent thought and artistic feeling as your helpers, instead of with imitative effort as your fetter, the result will not be the Englishman's house at all, but something essentially different, essentially your own. And this, too, let us rejoice to note, is done more often and more successfully year by year."

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LIBERAL-MINDED employers would do well to take advantage of the present favorable opportunity to show an intelligent interest in the affairs of the workmen in their employ. The agitation of the past six months, like a thunder shower in summer, has cleared the atmosphere. Labor and capital are both tired of strife, and are anxious for an honorable and profitable peace. Employers have learned to respect the power of organized labor; workingmen have learned that, whatever the agencies at their command, they cannot accomplish results at variance with the natural laws of trade; that wages and hours of labor are not arbitrarily fixed by employers, and cannot be arbitrarily changed by labor; that a strike is like a double-edged sword without a hilt, cutting both ways and wounding the hand that wields it; and that by temperate and conservative measures more can be accomplished than by violence. Strikes have exhausted the resources of the unions, boycotts have run their course and dropped from sight, and arbitration is coming to the front as a substitute for strife and contention. Would it not be wise for employers to take advantage of the more tractable mood of labor to establish more intimate relations with their men?

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WE THINK it will be admitted that not one in a hundred of the complaints which now go to the unions need ever be taken outside of the shops in which the real or imaginary grievances originate. A committee of arbitration could hear and dispose of them as they arise, and through the conferences of such a committee employers and wage-earners would both gain a better idea

of their mutual relations and of the means by which their mutual advantage could be promoted. It is unnecessary perhaps that such a committee should have any absolute powers. It need not have power to bind either side. Employers cannot be expected to surrender the right to manage their own business, and labor is not likely to relinquish the privilege of enforcing its demands by the usual methods. It is probable, however, that a properly constituted arbitration committee, composed of four, two representing the employers' interest and two selected from the wage-earners for intelligence and discretion, could adjust all disputes on a basis so fair and satisfactory that both sides would be satisfied. That disputes and differences will constantly arise is inevitable. It is better that they should be settled in the shop than in a union; and if the interests of labor need to be urged or defended, it is better that those immediately concerned should present them than that the secretary of a union or a walking delegate should be called in. In its present mood labor would appreciate the spirit which would prompt employers to organize such committees, and the conditions must be hopeless where they would not have a good result in harmonizing conflicting interests and making labor more contented.

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WE KNOW of one district in which, by the efforts of one public-spirited citizen, this system has been established in nearly every workshop and factory, with the happiest results. Strikes and lockouts have been almost wholly averted, and not one complaint reaches the union where formerly a hundred did. Employers and men are well satisfied with the experiment. Every shop has its board, which can be called together on five minutes' notice. In no case is it understood that such a board has final authority or that its decisions are binding. That they are usually just, however, accounts for the fact that they have thus far been accepted by both sides in good faith, and that strikes are found unnecessary. This is the only kind of arbitration which is either desirable or possible. Employers will not carry their private affairs before a public tribunal created by legislative enactment. Most labor troubles originate in misunderstandings. The managing spirits of the trade unions magnify them to the utmost, and fan into flame every spark of discontent they discover. By correcting misunderstandings before passions are excited or angry feelings are engendered, most of the causes of strikes will be disposed of before any harm is done. The experiment entails but little trouble and no expense. It can be abandoned if for any reason it is found to work unsatisfactorily. It is certainly worth trying.

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MUCH has been written and printed concerning the advantages accruing to Pittsburgh and other favored regions from natural gas. The editor of the Philadelphia *News*, in writing upon this subject, goes into ecstacies over the sights that he witnessed in a recent visit to the gas fields, and with respect to the emancipation of housewives from the drudgery of managing fires using the old style of fuel. An extract from the article will prove of interest to our readers: "The introduction of natural gas into Pittsburgh means that the housewife is no longer a slave. It means that the domestic is no longer a serf. It means not getting up in the morning to build fires that will not burn. It means absence of coal bills and absence of coal. It means no necessity of dragging coal from cellar to kitchen and cinders from kitchen to cellar. It means absence of dust and dirt. It means that the kitchen shall no longer be a place of torture, and that the housewife is freed from the domination of all the ills that a range is heir to. Let me tell the whole story by one simple example. While driving through a Pittsburgh suburb I stopped at a roadside inn 6 miles from the city. It never entered my head that a recent innovation had progressed that far. In a roomy, old-timed tap-room with sanded floor was a very large stove that evidently gave a resting place for many feet on winter days and nights. As I was about leaving I noticed that a small pipe led into its center, which differed in no other respects from those of its kind. I inquired of the good mistress of the place for what the piping was intended, and with a surprised look she answered, 'Why, natural gas, of course.' Then she showed me how it was used. The stove instead of being filled with coal contained a quantity of old broken firebrick. Upon this she placed a piece of burning paper, and then turned a valve in the piping. Instantly flames surrounded the clay fragments, and in an incredibly short space of time they were red hot and emitting a fierce glow throughout the room. 'But this is only a small portion of the use we put it to,' said the smiling housewife. Reaching over her head she turned the keys of a gas burner, and applied a lighted match. A soft, brilliant light shone forth. 'That is not also natural gas?' I asked, in surprise. 'Yes,' she said, laughing pleasantly; 'but come and I will show you that which is greater than all to me,' and she led the way to the kitchen. There she had a large range, also filled with brick, and into this pipes led. She turned on the gas and lighted it, and in a few moments she had as fierce a fire burning as could have been obtained with coal only after the expenditure of an hour's time and trouble. Now, get all that into your noddle. That woman from the same service-pipe was doing her cooking and was heating and lighting her house."

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THE DIFFICULTIES of ventilation are thus described by a writer in an exchange: "Some idea of the difficulties of ventilation may be gained if we substitute for air to be carried through conduits and distributed throughout a building with hermetically sealed doors and windows a heavier fluid—water, for instance. It is to be understood that not only shall all the rooms and vacant spaces be constantly filled with water, but that in no place, not even in the angles of the rooms or at the floor or ceiling, shall there remain for any considerable period stagnant water. All the particles must constantly move from the inlet to the discharge. It will be perceived at once that such a stream or current of water could not be supplied and thoroughly distributed throughout the enlarged chambers of a building without application of force. Circulating pumps would at once be suggested by any mechanic. The chief difficulty would not be that force proportionate to the mass moved must be applied, but might be expected in the disposition of the inlets and outlets, adjustment of the areas, of the conduits and their connection with the chambers, so that no particle of water should find a permanent lodgment, but that every place should be swept by the current without the possibility of stagnation at any point. It must be quite evident that such a problem would perplex the most accomplished engineer. If now we consider the fluid to be air—a compressible fluid possessing at every point a density depending on its temperature and pressure—the problem is not essentially altered, except that it becomes, if possible, more complicated. Its complete solution in the manner described is difficult; and when the conditions are added that the air must be heated in cold weather, and that strong currents must nowhere be created in occupied rooms, it will be perceived that through ventilation is extremely difficult."

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THE BAY-WINDOW question, which for a long time occupied the attention of the courts in Boston, and which subsequently came up for attention in Philadelphia, and has more recently arisen in New York, seems to have become national in its importance. A controversy between adjacent property owners, one of which is the proprietor of the Hotel Kensington, Boston, reached the Supreme Court a short time since, and the decision was to remove the windows. It seems that this order was delayed for a time on the plea that its execution would disturb an invalid in the house. The time was extended until the end of May. Before this time had expired, however, the holder of a mortgage on the building asked for an injunction against the owner on the plea that it would impair his security. The petitioner's prayer has been granted, and, although the hotel proprietor was the defendant in the original case, this curious result may come about, namely, that the plaintiff's victory wins the defendant's case.

## THE PLATES.

In Plates XXIX, XXX and XXXI we present front and side elevations, cross section, foundation and roof plans of an eight-room house, designed by H. E. Peipers, St. Louis, Mo. The details and floor plans are presented on pages 148, 149 and 150. This study is elsewhere described in full.

In Plate XXXII we give some examples of details of Elizabethan and Jacobean furniture. Concerning these designs Mr. R. Brook writes in one of our English exchanges as follows:

The impossibility in many cases of distinguishing between Jacobean and Elizabethan furniture induces us to include them under the same heading. As a matter of fact, there are certain variations in detail which enable those who have great experience of the subject to state with tolerable accuracy to which of the above reigns pieces of "old oak" may belong; but there are many more instances in which even the highest authorities would be at fault, for the simple reason that the Elizabethan style of ornamentation and construction was continued far into the reign of James I. It was really toward the end of the reign of James that a more clearly defined alteration in style was to be observed—the construction became simpler, and more Italian in feeling, and the carving and other enrichments were used with a more sparing hand. So it may be taken for a general rule that the more ornate specimens are Elizabethan, and the simpler and more severe ones are Jacobean. It would possibly be more correct to describe the style of which we are speaking as "English Renaissance"; but here again we should not be absolutely correct, for, although the revival of classical taste actually took place in England, it was not only introduced by foreigners (chiefly Italians and Dutchmen), but during many years almost exclusively carried on and practiced by them. True it is that a fine school of English architects and designers eventually arose, but the initiative and early stages of development must be credited to foreign artists. As early as the commencement of the sixteenth century, during the reign of Henry VIII, Gothic forms began to give place to classic ones. Hans Holbein, the court painter, was one of the artists who exercised a great influence on the decorative work of this time. His designs are almost purely Italian in character. This standard

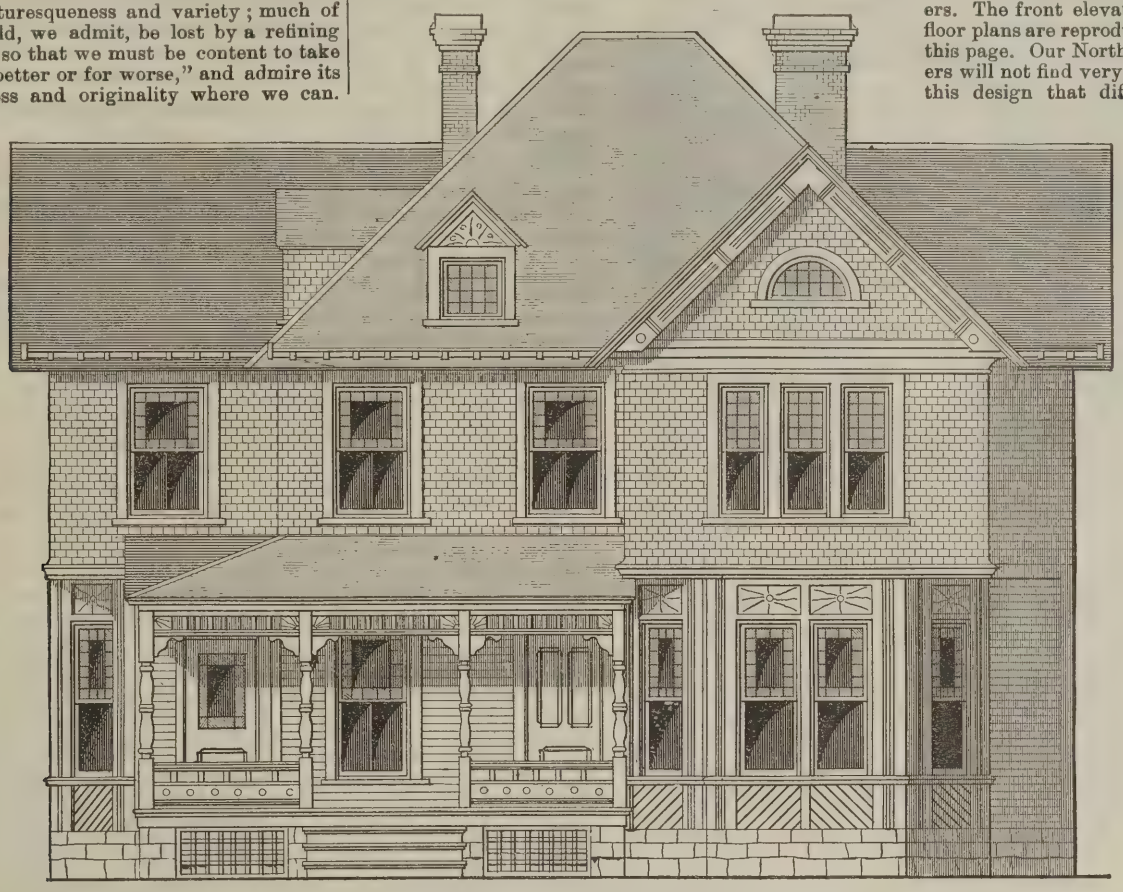
of purity was unfortunately not sustained by his successors, but allowed to degenerate into a coarseness of detail which cannot be wholly commended by persons of cultivated tastes.

The great charm of Elizabethan woodwork is its picturesqueness and variety; much of this would, we admit, be lost by a refining process, so that we must be content to take it for "better or for worse," and admire its quaintness and originality where we can.

and city in the country. Carved chests, bedsteads, cupboards or buffets, chimney-pieces, chairs, tables and settles, generally of oak darkened with age and very massive, still remain to remind us of the sturdy

## Southern Residence.

We are indebted to Mr. S. W. Shepard, of Knoxville, Tenn., for a drawing representing a southern residence, which no doubt will be interesting to our readers. The front elevations and floor plans are reproduced upon this page. Our Northern readers will not find very much in this design that differs from

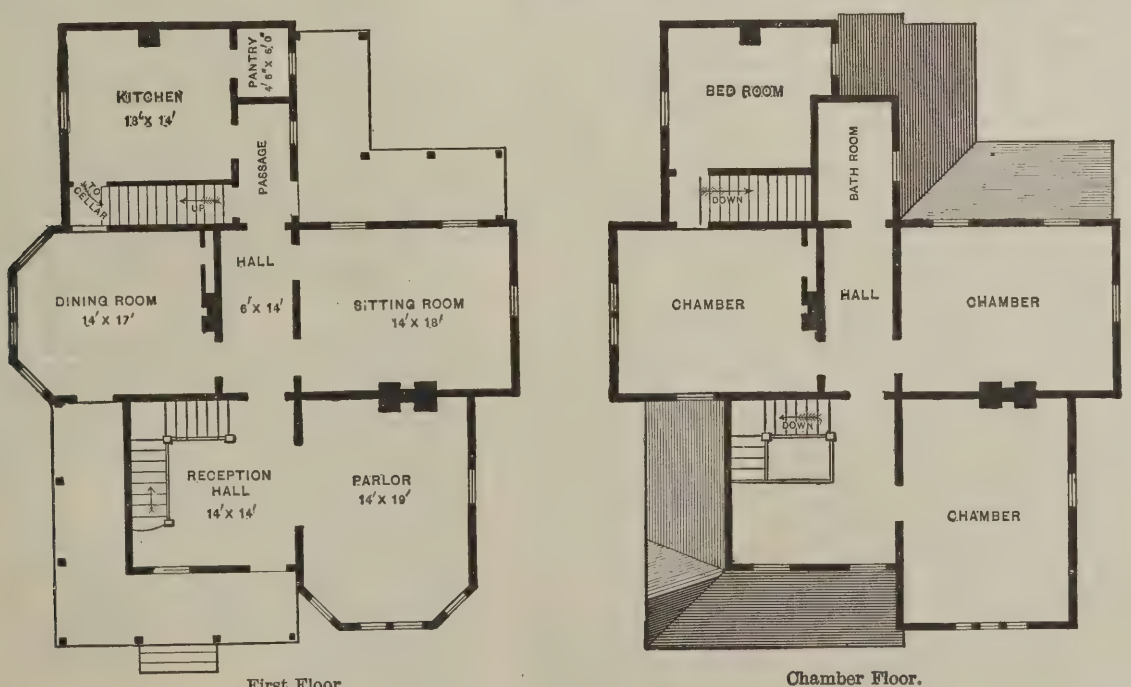


*Design for Southern Residence by S. W. Shepard.—Scale, ⅛ Inch to the Foot.*

Unlike many other styles, the difficulty in this case is not to find examples, but to select from the enormous mass of materials such specimens as shall be fairly representative and characteristic. There is hardly a

period when the English word "home," which has since become the most cherished in our language, was first properly understood. Plate XXXII contains examples of stair balusters, chair legs, supports to buf-

their conception of a house, and yet built without some slight modification it would scarcely be satisfactory in the northern belt of the country. A conspicuous feature is the large reception hall, and also




First Floor. Chamber Floor.

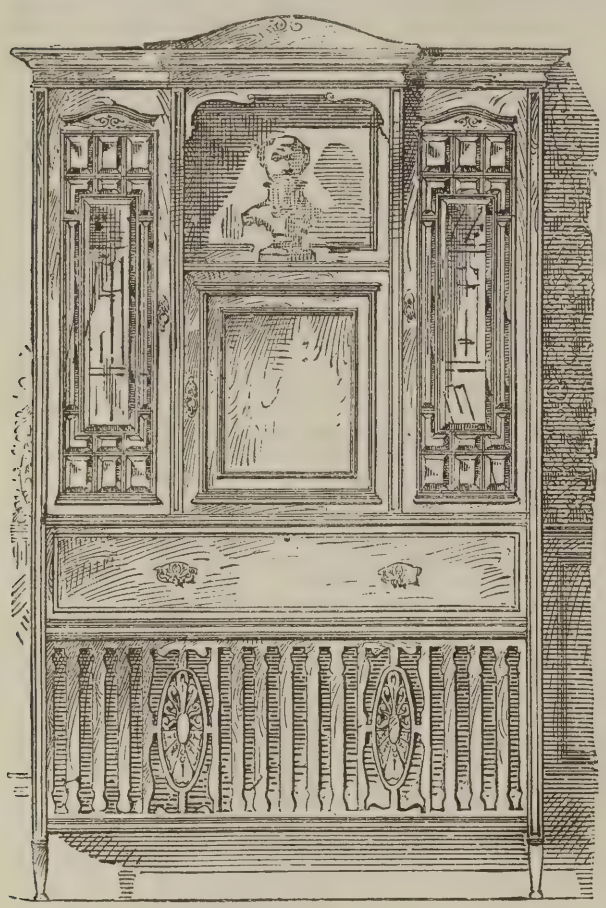
*Floor Plans Southern Residence.—Scale, $\frac{1}{16}$ Inch to the Foot.*

county in England that does not possess ancestral halls containing examples of old oak furniture and fittings and specimens of less importance, although perhaps equally interesting, may be found in every old town

fets and tables. Some of the latter, shown at bottom of sheet, are enormously heavy, to our thinking—possibly not unnecessarily so, as they were, of course, made for rougher times than our own.

the corresponding hall over it on the second floor. Both of these rooms are well lighted and form an attractive feature of the plan. No means of heating them, however, are shown in the plans. In the South, it is pre-

sumable, special heating in these two rooms would not be required. Our correspondent says that the object of his design has been to secure large, well-ventilated rooms and an economical arrangement in the space afforded.



*Designs for Bookcases.—Fig. 1.—Case with Rack at Bottom.*

## Designs for Bookcases.

We present herewith three designs for bookcases, which many of our readers will find very acceptable additions to the assortment of furniture designs adapted to home construction which have characterized our columns in the past.

In connection with the furnishing of a house it is not always convenient to appropriate the whole of an apartment expressly to the pursuit of literature. Particularly is this so where the house is small and the rooms are few. In such a case one room may well be made to answer the purpose of sitting-room and library combined, and for an apartment of this descpription the ordinary somber-looking mahogany bookcase is scarcely the thing. An article combining the elements of the cabinet with the bookcase is decidedly more to the purpose. With regard to bookcase No. 1, it may be objected that there is too much of the wardrobe appearance about it. Such a form is, however, we think, as well suited to a bookcase as a wardrobe, providing, as it does, more accommodation for books and presenting a lighter and more elegant appearance than the traditional inclosed solid-looking lower carcase, which may be all very well in its proper sphere, the library pure and simple, but is not desirable for such an apartment as we are now considering. The lower part is particularly adapted, upon rather fresh and novel lines, for the reception of portfolios, long rolls of paper, diagrams, &c., articles which, on account of their unwieldy proportions, are usually so difficult to dispose of. The sides of the job are intended to be left open to afford access to the interior, which is open from end to end. Such an arrangement has its advantages, as certain articles, such as are mentioned above, can be placed in at the sides with more facility than in a recess or cupboard, and they are more accessible when wanted.

Bookcase No. 2, although more ordinary in character than its companion, possesses one or two special features worthy, we think, of the attention and consideration of our readers. The glass doors in the upper part, instead of opening in the ordinary way, open outward horizontally, after the style of a flap, each one independently of the other. This arrangement is not without its advantages. In the first place there is not such a strain upon the hinges as there is necessarily upon the hinges of doors opening perpendicularly, which undoubtedly suffer considerably from the constant swinging to which they are subject, besides being, as they generally are, an inconvenience to one's elbow while in the act of searching for a volume. In the flap-door system the former objection with regard to the hinges is avoided, as the flap when once down cannot swing, on account of its being flat with the face of the bookcase, and in consequence is entirely out of the way when a search for a book is being made. Doors placed in this position also admit of a varied treatment in connection with the glass panels, as shown in our illustration, the upper door differing in design from the lower one, with a pleasing result.

Bookcase No. 3 would be a suitable fitting to a *boudoir* or studio, where plenty of accommodation for books is desirable. The upper and side cupboards could be used either for curios or books. The proportions of this bookcase admit of easy access without the aid of library steps—a very desirable feature. Where space will allow of its being taken into consideration it has its advantages in more senses than one. For instance, where has dust more opportunity of collecting than upon the top of the bookcase? Simply because it is out of the convenient reach of the servant's duster, and any attempt to reach it is dangerous to life and property. Moreover, in a great many cases the aid of a telescope is almost necessary to see the titles of the books upon the topmost shelves, and to get at them is out of the question. It is in the hope of remedying some of these evils which are within everyone's experience, that we publish the above suggestions.

A new building material called "asbestine" is to be put on the British market, for which remarkable fire-resisting qualities are claimed, as well as superior hardness and adhesiveness and applicability at all temperatures. It is proposed to make it a substituto for plaster as at present mixed, because it requires no hair, and it is represented not to crack under the influenco of fire, as ordinary plaster does, and will therefore provo a check to the spread of flames. Another advantage claimed is in dispensing with wooden laths, as the new material will be applied to thin sheets of corrugated iron, which alone will afford considerable protection. Asbestine is also represented to be of superior value for purposes where cement and mortar are ordinarily used.

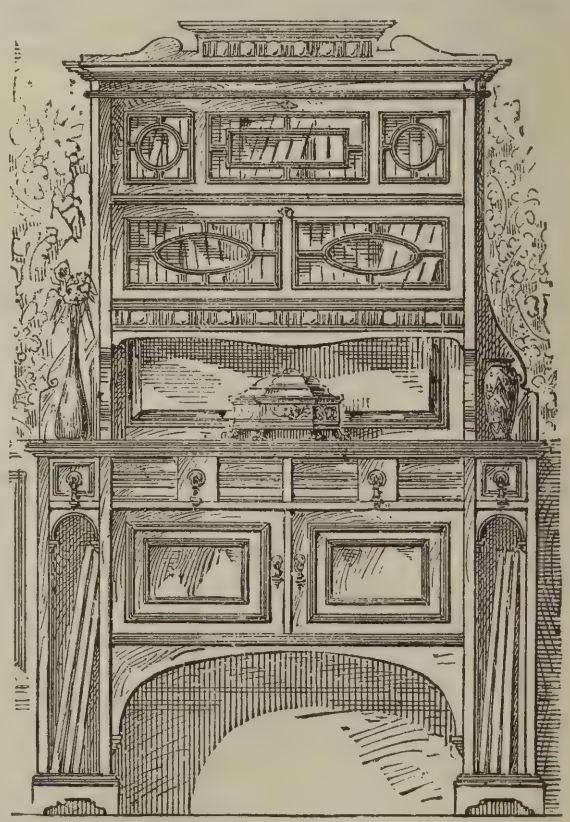


*Fig. 2.—Case with Horizontal Glass Doors.*

## Seventeenth Competition.

[We continue in this issue some very general criticisms on the studies submitted in the Seventeenth Competition. In part these remarks are prompted by requests from the competitors, and in part they proceed from the desire to assist young and aspiring draftsmen in their effort to acquire skill and a position in the world. In every instance what we say is with the best motives and offered solely in the interest of those whose *noms de plume* appear below.]

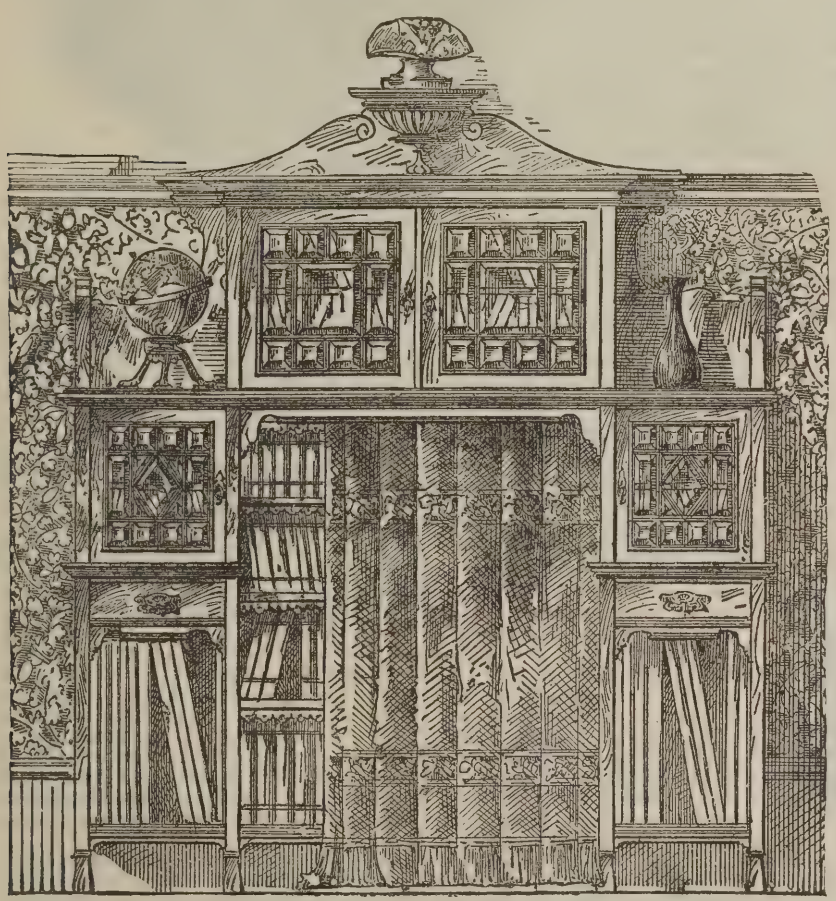
The perspective submitted by "Vola" (No. 67), while it contains some meritorious features, shows that the delineator would profit by systematic instruction in the use of lines. The effect is marred by lack of contrast and too much fine hatching with the pen. This picture also shows, what is revealed in many other instances, that those who can draw houses easily fail in landscape and foliage. "Vola's" picture would have been better had the trees been omitted. The elevations and floor plans are more creditable and are much superior to the perspective. In details this study is lacking. All that are shown are two sketches of a balcony that surmounts an oriole window in the front. By no possible construction could this be considered a fair selection of details. This author will gain by practice, so far as proportion is concerned, for his details are sadly deficient in this important particular.

A study that was better than the average in the quality of its general features was submitted by "Economy" (No. 66). The floor plans in this case were colored, which, while very desirable in ordinary practice, is objectionable when they are intended for reproduction by direct process. The perspective view is not equal in general quality to other features of the design. The point of view is not sufficiently remote, and it lacks those sharp contrasts in light and shade which make a drawing effective. The trees, landscape and figures that are in-

troduced detract from the quality of the architectural work.

"Mechanic" (No. 46) sends a study in which more attention has been given to dimensions and those general features which a builder would consider at the outset in examining a design than to the fine architectural features which would give it quality and character when erected. Many things in the details, a creditable selection of which are presented, are left to a general understanding. Spiral supports and carved moldings in one of the mantel designs, for example, are indicated by hurriedly made lines, and there is no attempt at finish in any of the drawing. The design is worthy of better treatment than this, and when examined at a distance looks better than when subjected to a close scrutiny. This author will do well to give attention to draftsmanship and to be more patient in working out his ideas.

"Dirigo" (No. 33) presents a study which on first inspection appears to represent a house that is low or squatty. This is due somewhat to the way that the pro-



*Designs for Bookcases.—Fig. 3.—Case with Ample Room for Large Books.*

jection of the roof above the principal porch is managed, and to the fact that the cornice is run horizontally under the gables in the style that was largely in vogue many years since. The planning of the building suggests a farmhouse rather than a dwelling for town or suburban use. A wood shed is joined on to the end, so as to present its door to the front. The kitchen also opens to the front, while the rear of the building has no doors whatever. Such a house would scarcely please the majority who build. This author will also do well to study perspective. His effort is spoiled for reproducing by a number of fine lines and a large amount of cross hatching.

"C. F. C." (No. 64) is a draftsman who has a remarkably fine touch, so far as lines are concerned, and his study is a model of neatness in many particulars. It is lacking in details, however, nothing being shown except a vertical section through the front, being, in fact, a diagram for giving hights of stories, and a horizontal section through a window frame. The great care with which many designers give carpenters their ideas about window frames would lead one to suppose that in the estimation of architects carpenters need more assistance in this regard than in any other direction. On the contrary, we suppose that if there is any one thing about a house which a carpenter or planing-mill man will manage according to his own ideas it is the construction of window frames. We venture to say that not one drawing among a hundred that are made is ever accurately followed. "C. F. C.'s" perspective is interesting to look at, but would reproduce unsatisfactorily from the fact that the lines are brown, rather than black, and the effect is obtained by close ruling rather than by sharp contrast of black and white. A very little study and practice would cause this competitor to rank much higher than he does at present.

The author of the design bearing the *nom de plume* "Liddy" (No. 79) has more than average skill as a letterer. He seems anxious to display his talent in this direction and accordingly has drawn diagonally across some of his details the lettering that describes the views and the scale to which they are constructed. These lines would spoil them for use by direct reproduction for any periodical. The scheme does not look bad upon the drawing, but it would look very bad in a printed page. The elevations submitted by this author are well done and show skill in draftsmanship, The outline of the plan, however, is very irregular, and the house would be more expensive to build than many others having the same conveniences.

The author of the drawings bearing the *nom de plume* "Effort" (No. 43) has gone to considerable trouble in preparing a portfolio for containing the plans. The perspective sketch is on bristol-board, while the other views are in the form of tracings. A blank sheet of paper is interposed between adjacent pages, for what purpose, however, we fail to see, because there is no possible chance of the drawings offsetting or smudging. The fact that very poor quality of paper and of small size has been used for these blank sheets rather detracts from the appearance that would otherwise have been secured. The study has been carefully worked out, and is somewhat above the general average of those which represent the majority in this competition. The perspective sketch is open to the objection of careless work, due to free-hand lines, and would present a very unsatisfactory appearance if engraved.

"Arch" (No. 42) submits a study in a portfolio which is of a character to be used repeatedly for the same purpose. The drawings are put up in good style, being carefully eyeletted in position. There are many things about the study which commend it, but the elevations contain a blemish which, were everything else satisfactory, would detract from the value of the work for publication. A very peculiar design of cresting is employed, and at the termination of the respective gables there is something which somewhat resembles the head of a chicken. Measuring by scale we find this device to be some 3 feet in hight, with a projection of about 2 feet. This enormity is repeated in the details, and is there marked, "Details of Galvanized-Iron Cresting." Many sins have been committed in the name of architecture and charged to the galvanized-iron cornice manufacturer. We have long been persuaded that some of them at least should lie at the door of the designer, and here is a case in point. The specification submitted by this author is very neatly done on a typewriter.

The author of the design named "Chips" (No. 30), distrusting his ability to obtain proper effects in linework, has brush-washed portions of his elevations and thus spoiled them for reproduction. The details submitted are very few, and are of a character to be of little service to the builder. His floor plans are also colored in the wall lines, which would make it impossible to reproduce them. Their only chance for publication would be by line engraving. We refer to these points because various other architectural papers in addition to *Carpentry and Building* are soliciting designs for publication. The conditions we named are not peculiar to us, but are used in other directions as well.

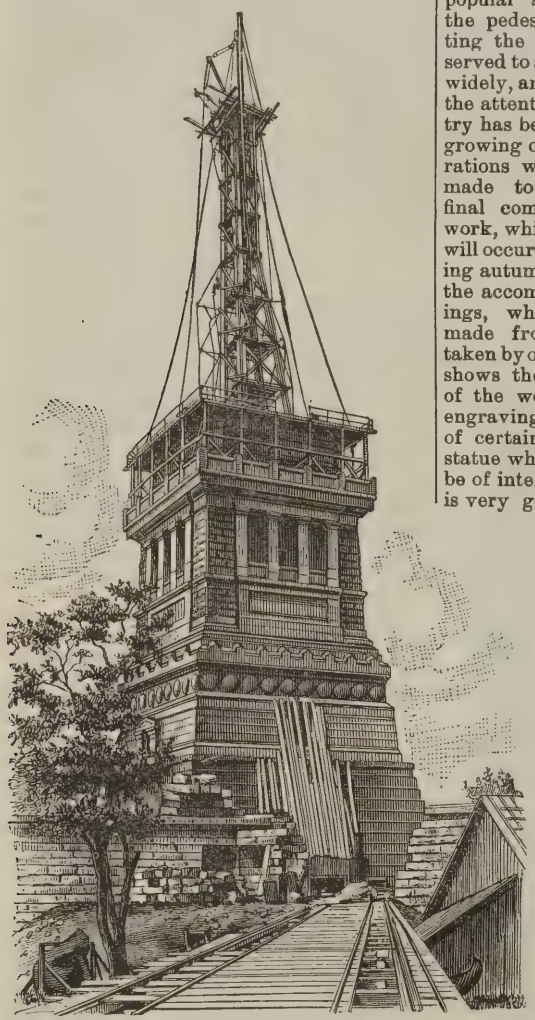
The most flashy study of elevations and plans received in this contest is that submitted by "Columbus" (No. 6). The designer is evidently an expert at that branch of the painter's art called "graining." He also knows something about pictorial effects and the value of color when judiciously applied. His sheets of drawings simulate pieces of board on which it would seem that pieces of paper have been carelessly laid. On the pieces of paper appear the different views. The pictorial effect is excellent, and the shading around the margin of the sheets is such as to make them good counterfeits. Four elevations, four floor plans and a roof plan constitute the principal views. Among the details is a representation in colors of a brick mantel-piece in the dining-room. Above it are the usual pieces of *bric-à-brac*, and on the wall is a painting, all in colors, including the gilt frame. Other details appear done in india-ink alone, but in all the views brushwork is employed, which, as we have explained, spoils the study for the purpose of reproduction. The house shown is not without its merits, and the style in which the author is working is calculated to please certain clients.

"Mossback" (No. 48) presents a perspective view which is spoiled by cross hatching, and which for the effect to be produced is taken from a point of view too near the object. His elevations show better draftsmanship, but they are not complete, and in various places are supplemented by the words "siding," "shingles," "stone," &c., written in where representations of these materials should appear. His details are meager, and are such that almost every intelligent carpenter would wish to depart from them simply for the sake of good construction.

One of the most ambitious perspective sketches to be found among those we are criticising is that forming a part of the study bearing the name "Home" (No. 44). The picture fills a sheet of bristol-board measuring 13 x 19 inches. Various parts are so finely drawn that they could not be reduced to reasonable size even if it were desirable to attempt it. There is a monotony prevailing throughout the view, and an absence of those sharp contrasts which are so generally to be desired. The effect which the

author has sought to obtain is diminished rather than enhanced by an attempted landscape at one side of the house, and an impossible boy poised in a trying position on a fence, flying a very poor kite, at the other side. A figure, presumably an effigy of the mistress of the house, which appears in the front balcony, also detracts from the architectural features. In general we are prepared to advise architectural draftsmen to shun landscapes and figures as they would a pestilence. They are seldom introduced except to the disadvantage of more important parts.

All that we have said about landscapes, foliage, cross hatching and unfortunate points of view in connection with perspective sketches applies to "Smack" (No. 60). Some of the faults extend to his elevations,



*General Appearance of Pedestal of the Bartholdi Statue of Liberty.*

and he has colored his floor plans so as to spoil them for reproduction.

"A. C. E." (No. 2) has made some unfortunate mistakes in his perspective view. The principal entrance door is in a recess having a projecting hood, over which the second story also extends. In his lining he has made the recess appear as though it were in the same plane as the outside walls. In spite of this he has drawn the door which opens at the end of the recess, and has shaded for the projection of the hood. It requires considerable study in examining this sketch to determine what the author intended, and it is only by comparison with the plans that the scheme is finally discovered. Cross hatching, or what some draftsmen would call "picking," is the fault of this perspective, which in some other respects is very good. It is not, however, by any means up to the draftmanship displayed in the elevations and floor plans. The former of these are not quite so effective as they might be if a little more care were used in the shade lines. This author will improve by careful study of draftsmanship and intelligent inspection of such work as he has the opportunity of examining.

(To be continued.)

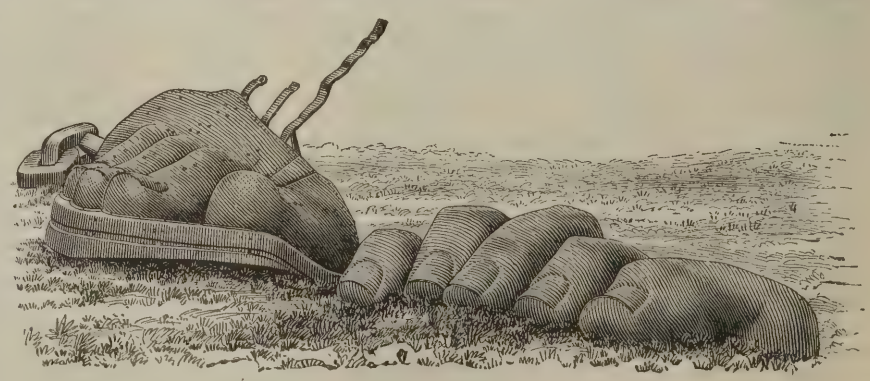
## Bartholdi Statue of Liberty.

A short time since work was commenced on putting together the metal-work of the Statue of Liberty that is in process of erection on Bedloe's Island, in New York harbor. The pedestal was finished some months ago, and in the interval the interior framework of wrought iron has been in progress. No single piece of patriotic or engineering work perhaps has ever attracted more attention than this statue. The efforts made to raise the money by popular subscription for the pedestal and for putting the statue in place served to advertise it very widely, and more recently the attention of the country has been drawn to it, growing out of the preparations which have been made to celebrate the final completion of the work, which it is expected will occur during the coming autumn. The first of the accompaning engravings, which have been made from photographs taken by our special artist, shows the present stage of the work. The other engravings give an idea of certain details of the statue which are likely to be of interest to our readers. The statue, as is very generally known, is made of sheet copper, of heavy gauge, and is to be supported by an interior framework of iron. The several sections of which the statue are composed are riveted together, and some of the riveted joints are very clearly shown in our engravings. Our second illustration shows the inside of the face and indicates the bracing that is employed to support it. Opposite this, on the next page, is an outside view of the face, shown in connection with the temporary framework which has been erected for holding it in shape while being put together. Some idea of the large dimensions of this figure may be derived from the statement that the hight of the face as shown in this illustration, measuring from the chin to the point in the work representing the forehead, is something over 12 feet. The two engravings at the bottom of this and the next page show details of the feet and fingers, the chain on which liberty is to be shown standing, and other parts. The finger nails are about the size of an ordinary chair-seat, and this will also serve as a scale by which the various parts may be estimated. If our readers will examine the first engraving very carefully they will detect men in the rigging and about the ironwork, one in particular nearly half way up the framing that is shown above the pedestal. Viewed from the point at which our photograph was taken, men in these positions look somewhat smaller than average spiders in a web, a fact which

*Back of Face, Showing Supporting Framework, Joints, &c.*

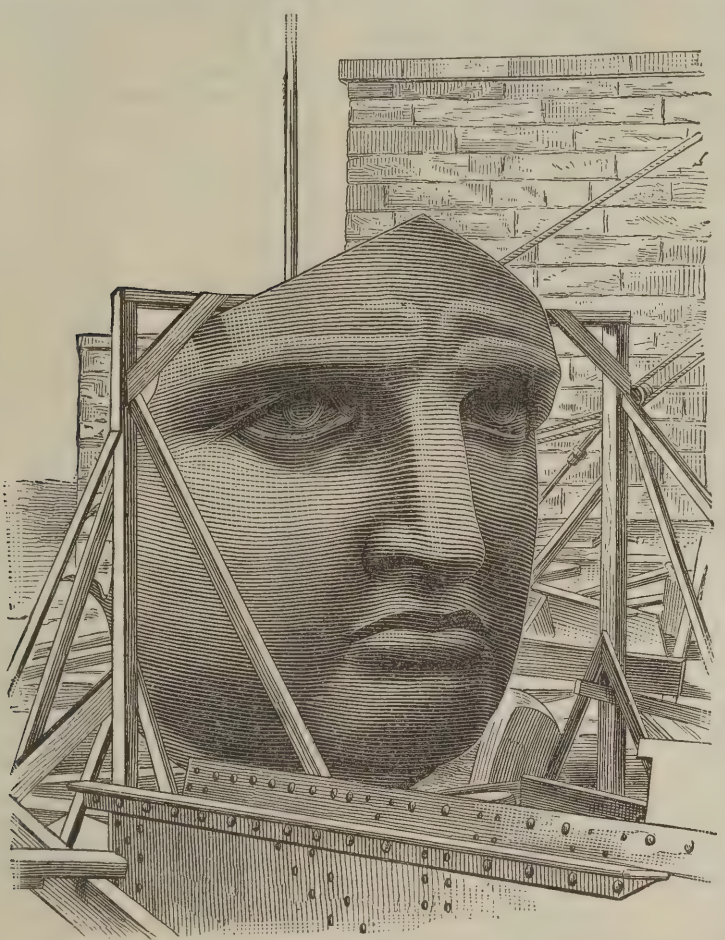
serves still further to give an idea of the vast dimensions of the work. In the cut at the bottom of this page, showing the toes of one of the feet alongside of the fingers, details of the bracework are presented. Similar braces are also shown in the cut immediately opposite. The work is an interesting study throughout, and its general progress is being carefully recorded in the columns of the daily papers.

In this connection it may be of interest to our readers to be reminded of some of the more important features of the conception and execution of this work. Soon after the Franco-German war, a party of men eminent in politics and letters conceived the idea of uniting at the approaching 100th anniversary of the independence of the United States with their political friends in America in a common demonstration. It was proposed to present at the celebration of the event a token of friendship in the shape of an exceptional monument glorifying the union between the two countries. This plan was adopted with great enthusiasm. A young French sculptor, Auguste Bartholdi, who had already given proof of exceptional talent, was sent to the United States to confer about the project and to discover a thought in harmony with the object to be attained. The result was the idea of a colossal statue symbolizing "Liberty Enlightening the World." On his return the foremost men of France became interested in the scheme and formed in 1874 the French-American Union for the purpose of promoting the work. An appeal to the people of France was heartily responded to, and the movement



*Portion of Chain, Foot and Fingers.*

soon became a general national demonstration. The funds to pay for the work were soon raised by popular subscription. To give the Americans an adequate idea of the work, the right hand of the statue was executed in time to be sent to the Centennial Exposition at Philadelphia. The completion of the work, its shipment to this country, the means which were employed to raise money for building the pedestal, and the progress of the enterprise generally since it passed into American hands, are so well known as to need no repetition in this connection.



*Front of Face as Temporarily Supported for Putting Together.*

Some particulars concerning the means employed in producing the work may also be of interest. The first step upon the part of the artist was to make a model just one-fourth the size of the real statue. After this came the task of making the full-size model in plaster. This was done in sections, the workmen copying every feature by patiently measuring on the smaller model. When the sections in plaster had been completed, wooden molds, exact copies both in size and modeling, were made. In these molds sheets of metal were laid and beaten down until they fitted the irregular surfaces. The sheets of copper were from 3 to 5 feet square, and even larger, according to the requirements of different parts of the work. The work was done in the celebrated house of Gaget, Gauthier & Co., of Paris. The statue was completely mounted in France in the spring of 1884. On the 4th of July of the same year the official delivery of the statue to the United States took place. The statue remained in Paris exposed to public view until January, 1885. Then it was taken down with care, all the pieces marked according to a definite scheme, and the work was packed, no less than 210 cases being required to contain it. The statue was shipped to this country, and arrived in New York on June 17. The official reception took place on June 19 of last year.

## A Chinese House.

In her new book on China, Miss Gordon Cumming presents a description of a Chinese house of the better class that will no doubt be of interest to builders of this country. In addition to references to construction, ornamentation, &c., the account contains some particulars concerning the customs of the inhabitants of such houses, and eccentricities in personal adornment. We present the following extract:

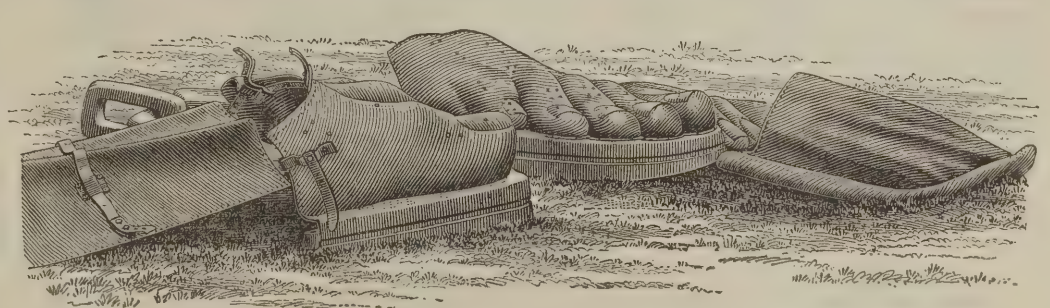
It covers so much ground, and there are so many open halls, consisting chiefly of pillars and ornamental roofs, scattered promiscuously about, among paved courtyards, decorated with flowers in pots, and then there are walls pierced by oddly-shaped portals formed like octagons or circles, or even teapots, and all placed at irregular intervals, never opposite one another; and then shady morsels of garden, with all manner of surprises in the way of little ponds and angular bridges and quaint trees. Then somehow, quite unexpectedly, you find yourself in brightly ornamental *suites* of small rooms which seem to have been orginally one great room, subdivided by partitions of the most elaborate wood carving, and furnished with beautiful polished blackwood and hangings of rich materials,

Such houses are, in fact, the patriarchal encampment of a whole clan, to which all the sons and brothers of the house bring their wives, and there take up their quarters, living together apparently in very remarkable peace.

We were received by our host and half a dozen gentlemen of the family, and for some time we sat in a fine open reception hall, drinking pale straw-colored tea in its simple form, and playing with a nice little son, the hope of the house. Presently our host (who is very friendly to foreigners, and from intercourse with them is less punctilious than most Chinamen on the matter of being seen speaking to his women folk) led us aside and presented us to his most kindly and courteous old mother, who conducted us to her apartments, her son accompanying us. He then introduced us to his little bride, aged 13. His matrimonial ventures have so far been unlucky, two previous wives having died very early. This one seems a nice, bright little lady. She was very highly rouged, as was also her sister-in-law. Another sister, being indisposed, was not rouged, nor was the mother, and therefore pleasanter to our eyes; but the Canton ladies love to lay on the color thick. There is no deception about it! it is good, honest red, laid thick upon the cheek, and carried right round the eyebrows. The latter are shaved to refine their form. They cannot understand why English ladies should refrain from such an embellishment. Only when in mourning do they refrain from its use, and one notable exception is that of a bride, who on her wedding day may wear no rouge, so that, when her red silk veil is removed and the fringe of pearls raised, her husband, looking on her face for the first time, may know for certain what share of beauty unadorned has fallen to his lot. But of all eccentricities of personal decoration the oddest, I think, is that of gilding the hair, which, I am told, young Canton girls do on very full-dress occasions.

## Dogwood.

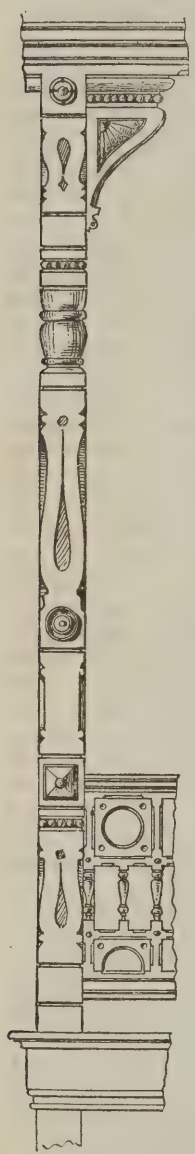
Concerning dogwood we find the following particulars in the *Lumberman's Gazette*: "In an economic point of view the wood possesses many valuable qualities, and for this alone it would be well worth growing. It is, in fact, a beautiful wood in grain and texture. It is hard, tough, fine-grained and heavy, its specific gravity being 0.8153. In color it is nearly white, slightly reddish at the heart. It has a beautiful satiny appearance, and takes a high polish readily. The medullary rays are numerous and conspicuous. It is an excellent wood for turning. As an amateur I have frequently used it in the lathe, and always with the greatest satisfaction. I know of nothing superior to it for this purpose in our American woods. I have often wondered that it was not used by engravers to a greater extent than it is, although I am told it is already employed for woodcuts quite largely. It seems well adapted for machinery bearings, and I should think it would make excellent wagon hubs. For tools and all manner of handles and mallets it has no superior. There is a tendency toward checking during the process of seasoning, however, especially in large blocks, which needs some care to overlook or prevent. But this is very apt to be the case with all hard, close-grained woods."



*Portions of Feet, Chain and Other Details.*

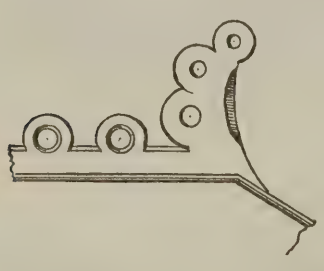
## Eight-Room Frame Cottage.

By means of our lithographic plates and the engravings on this and the following pages we lay before our readers this month a study in house designing by Mr. H. E. Peipers, architect, of No. 520 Pine street, St. Louis, Mo. The design is one of those that received honorable mention in the Seventeenth Competition. Mr. Peipers is a draftsman of more than average skill, and the engravings of his design, not only in the lithographic pages, but also those representing the details and published with the text, have been reproduced directly from his drawings. They are photo-engravings, and, as our readers will see, are of exceptional merit of their kind. From the specification and description accompanying Mr. Peipers' study we gain the following:



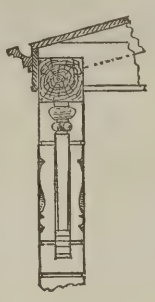
*Eight-Room Frame Cottage.—Porch Post and Railing in the First Story.—Scale, ½ Inch to the Foot.*

The framing employed is a modification of the balloon system. The sills, posts and plates are to be framed together, and the outside door and window studs framed in at the top and bottom. All other studding is to be nailed in place. The floor joists are to be spiked to sills and plates, and also to each other where they lap in the middle. One row of bridging is to extend through the center of each room. The rafters are to be spiked to the plate, and to project at their lower ends beyond the face of the building, and to be exposed as indicated in the details. The post in the cellar is to be 6 x 6, the girders 6 x 8 and the girders for front hall 8 x 10 inches. The outside corners of the building are to consist of two 2 x 4 and one 2 x 6. The common studs throughout are to be 3 x 4 inches, placed 16 inches from center and braced with 2 x 4 material. The sills and plates are to be 4 x 6. The first-floor joists are to be 2 x 12 inches, with the exception of the rear hall and kitchen, where 2 x 10 are to be employed. Headers and trimmers are to be

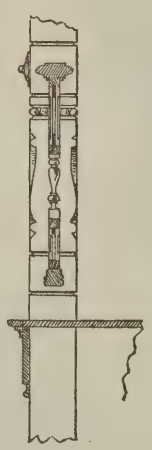


*Ridge Ornament.—Scale, ½ Inch to the Foot.*

4 x 10 inches. The joists are to be placed 16 inches between centers. The ridge-piece of the front building is to be 2 x 10 inches, and for the rear portion 2 x 8 inches. The hips and valleys for the front part are to be 4 x 10, and for the rear part 4 x 8 inches. The rafters for the front are to be 2 x 8, and for the rear 2 x 6, all placed 2 feet between centers. The flooring throughout is to be of yellow pine, with the exception of the kitchen, which is to be of ash. The porch floors are to be pitched and laid in white lead. The design of the doors is indicated by the details. The door to the pantry slides instead of swinging. The door from the second story hall to the balcony is be a sash door. All the doors are to be trimmed with mortise locks with white knobs. Box frames are to be used in the windows, and the sash are to be hung to turned axle pulleys with best Italian sash cord and with cast-iron weights. The cellar windows and roof windows are to be hinged. All the windows of first and second stories are to be provided with outside rolling blinds; the outside door of second story to have blinds also. The frame of the building is to be covered with ⅞-inch rough boards put on diagonally with close joints nailed firmly, and over the boards felt paper. The outside finish to be of the best quality clear, dry, beveled white-pine clapboards 6 inches in width. Clapboards to be laid with 1-inch lap, and the nails set in for puttying. The corner boards to be of 1⅛-inch stuff, 4 inches wide, and chamfered. The water table to be 1 inch thick. Lattice-work is to finish the spaces under the porch. The roof is to be covered with 1-inch rough boards, over which split cypress shingles are to be laid. The inside finish of the parlor and hall to be what is designated as pilaster finish, as shown by the detail. The finish of the dining-room is clearly indicated by the details. The wainscoting to be 3 feet 4 inches high, with cap, base and rosettes. The remainder of the finish to be 6 inches, molded and mitered. Molded stools and aprons are to be supplied to all the windows, and an 8-inch molded base to be supplied throughout. A molded carpet strip is to be provided for all doors. All the partitions and ceilings throughout are to be lathed with well-seasoned white pine laths. To be plastered three coats, and to have a plaster-of-paris hard finish. All the work is to be scratch coated and not laid off. The gutters throughout the building are to be of IX tin. The flashing of the hips and valleys is to be of zinc. Tin and zinc work to be painted two coats. With reference to the colors to be used in painting the house, the specification says that the body of the work shall be stone color, and the blinds and lattice-work to be of the best Paris green. The sash to be dark green. The ceilings of the porches to be light blue, with the steps and floors brown. The finish of the windows and doors, porches and hanging stiles is to be a light bluish-green. The inside work is to be grained in imitation of light oak. The graining on outside doors to receive two coats of varnish. The glass to be double-thick American.



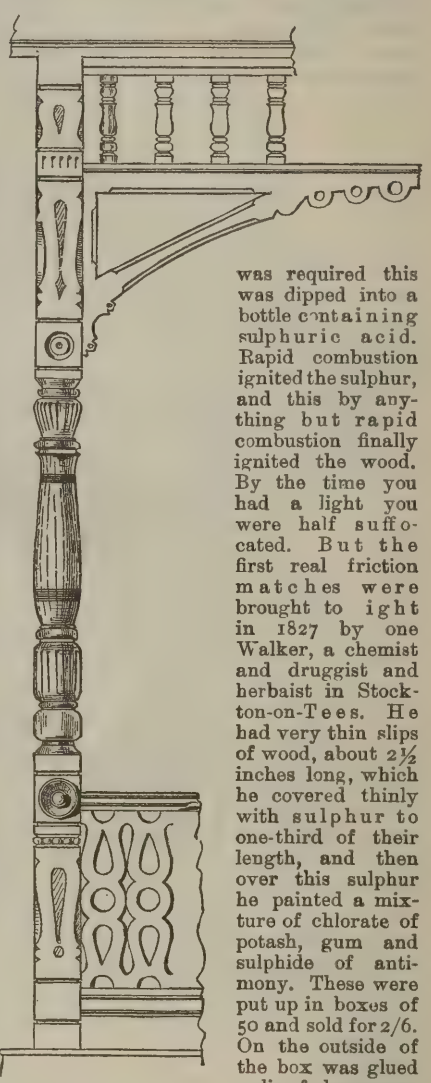
*Section Through Porch Cornice.*



*Section Through Porch Balustrade.*

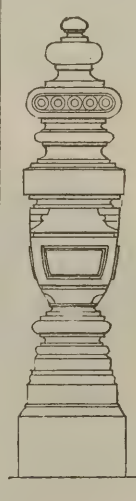
## Matches.*

The first friction matches of which we have any account were termed "sulphur matches, and "prometheans." Their value as instantaneous lights was due to the circumstance that a mixture of chlorate of potash and sugar at once deflagrates if touched by sulphuric acid, owing to the liberation of oxygen and chlorine. There were two kinds—one in which a splint of deal was tipped with sulphur, and again by sugar and chlorate of potash. When a light was required this was dipped into a bottle containing sulphuric acid. Rapid combustion ignited the sulphur, and this by anything but rapid combustion finally ignited the wood. By the time you had a light you were half suffocated. But the first real friction matches were brought to light in 1827 by one Walker, a chemist and druggist and herbaist in Stockton-on-Tees. He had very thin slips of wood, about 2½ inches long, which he covered thinly with sulphur to one-third of their length, and then over this sulphur he painted a mixture of chlorate of potash, gum and sulphide of antimony. These were put up in boxes of 50 and sold for 2/6. On the outside of the box was glued a slip of glass-paper to produce the friction necessary for lighting them. I give this man Walker the preference of having first introduced a portable friction match, because I have every reason to suppose he was really first in the field.



*Post and Railing in Second Story.—Scale, ½ Inch to the Foot.*

My holiday last year was spent in climbing most of the Cumberland peaks. One evening after a good day's work, I sauntered out of the Queen's Hotel, in Keswick, and went into a little museum they have in the town, and there among other things I saw a box of this Walker's matches. The museum ticket named it a "specimen of the first box of friction matches sold in England in March, 1827." It was a hinged box, and inside was an ancient handbill setting forth the wonderful merits of a sauce, one or two elixirs and some wonderful julep. The handbill was dated from Stockton, March, 1827. The reason why I mention this is because it is generally cited, I think, that the inventor of friction matches was a Sir William Congreve, a distinguished artillery officer, whose matches appeared only in 1832, and were identical with Walker's, except that you had to draw the matches between a piece of sandpaper to light them, hardly as elegant, therefore, as Walker's,

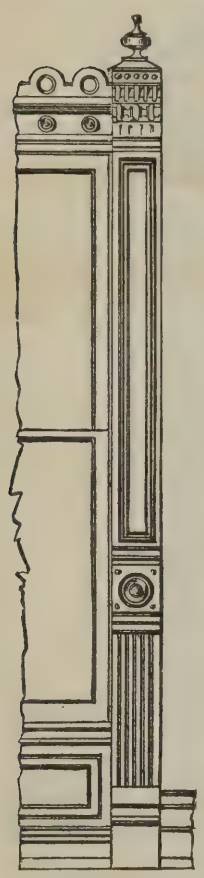


*Newel Post.—Scale, ½ Inch to the Foot.*

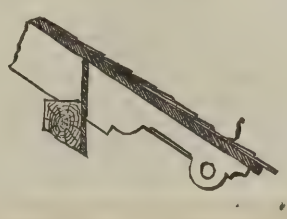
* From a paper on "The Light of Other Times," by Mr. W. Baxter, Jr., pharmaceutical chemist, read before the Chemists' Assistants' Association, England.

you see. These last matches went by the name of "Congreve's," and it was a fluke if you got one out of ten to light, I believe, as it required very sharp friction to ignite them.

It was in this year that phosphorus matches appeared simultaneously in several countries. In England, Walker, of Stockton, was the first to make them. Possibly piqued at the imitation of his first friction matches by Congreve, whom he saw making a lot of money out of them, he set his wits to work, the outcome of which was the first phosphorus match in this country—at least Professor Faraday names him as being the first person in the world to bring phosphorus into use in making matches. Walker's phosphorus matches were, however, intolerably bad; they were dangerously inflammable and horribly poisonous to the makers. The lower jawbones of these were principally affected; they gradually rotted away until the mouth became a perfect open sepulcher, for there was nothing to close its orifice, and then the poor wretches quickly died of consumption. These matches were made simply by tipping splints of wood with a greasy paste of chlorate of potash and phosphorus. But in 1845 Schrötter, of Vienna, made the discovery that by heating ordinary poisonous waxy phosphorus in vacuo he obtained the now well-known brick-red non-poisonous phosphorus known as amorphous phosphorus. This was tried by Schrötter in the manufacture of matches, and though he was successful in experiment his enterprise failed financially, for the papers had been so full of accounts of the frightful disease produced from yellow phosphorus that the public would have nothing to do with matches made from it. Consequently we find that about this time several of the modifications of the use of yellow phosphorus were introduced, one being what is known as the "luminous bottle." This was a bottle in which phosphorus had been melted and run thinly all over the inside surface of the same. This was then tightly stoppered. When a light was required, one of the old sulpher matches was put into the bottle and gently rubbed against its side; it was then brought out into the air and slightly rubbed against some felt or other material which ignited the sulphur, and subsequently the splint of wood; but this invention was not portable, and therefore was short-lived. There followed other devices more successful, some of which are still sold, I believe, in some places abroad. Among these were matches tipped in chlorate of potash, oxide of lead and phosphorus; sulphur matches, tipped in oxide of lead and chlorate of potash; splints, tipped with oxide of lead, nitrate of potash, and phosphorus (the silent matches so dear to the burglar), and sulphur matches tipped with the phosphorus composition, which is spread on a thin slab of stone to ⅛ inch in depth, and kept warm by steam underneath. When dry they are cut in two and packed in bundles of 100, ready for boxing.

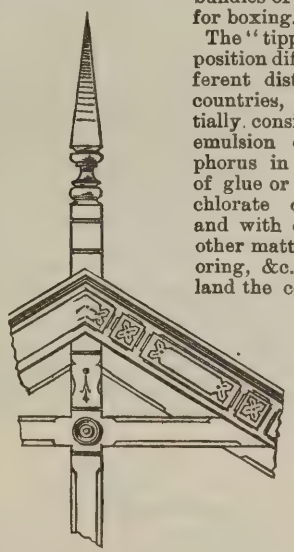


*Eight-Room Frame Cottage.—Finish of Sitting-Room.—Scale, ½ Inch to the Foot.*

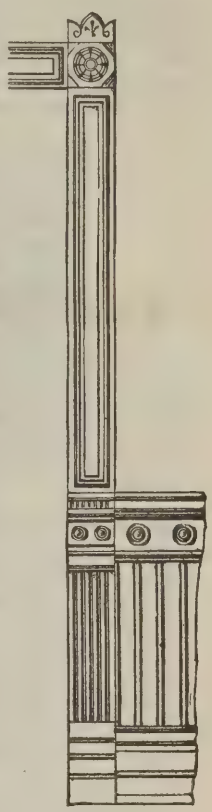


*End of Rafter.—Scale, ½ Inch to the Foot.*

The "tipping" composition differs in different districts and countries, but essentially consists of an emulsion of phosphorus in a solution of glue or gum with chlorate of potash, and with or without other matters for coloring, &c. In England the composition contains a considerable quantity of chlorate of potash, which imparts a snapping and flaring quality to the matches dipped in it, and but little phosphorus on account of the moisture of the climate. In Germany the proportion of phosphorus is larger, and generally some metallic oxide replaces the chlorate. Thus they light quicker with a lambent flame, but they are quickly spoiled if kept in a damp atmosphere. The phosphorus emulsion is made by soaking 2 parts of glue in water until soft, adding water to 4 parts, and melting the glue in it by the aid of a water bath at 200° F. Remove from the fire, and add gradually 1½ to 2 parts of phosphorus, agitating briskly all the time to form an emulsion. Add 4 to 5 parts of chlorate of potash, 3 to 4 parts of powdered glass and coloring agent, all in very fine powder. Stir until the whole is completely cold. The annual production of amorphous phosphorus is 1200 tons, of which over 90 per cent. is used in the match trade, the total supply being furnished only by two firms, viz., Messrs. Allbright & Wilson, of Oldbury, in Birmingham, and Messrs. Coignet & Son, of Lyons, in France.



*Elevation of Gable.—Scale, ½ Inch to the Foot.*

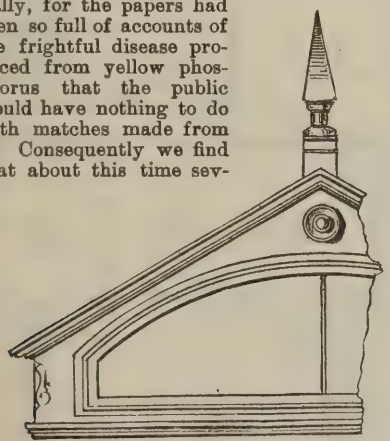


*Door Trimming and Wainscoting in Dining-Room.—Scale, ½ Inch to the Foot.*

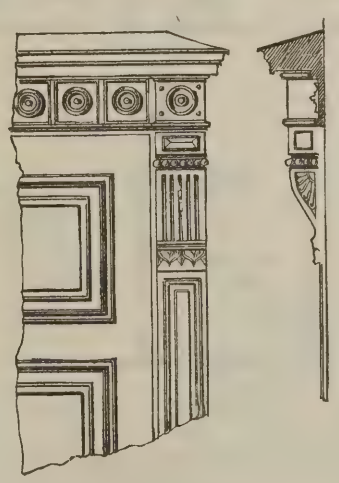
Wax vestas, which are now sold at the extraordinary price of 1d. for 250 about the streets, have a tip composition of the following:

| | Parts. |
|---|---|
| P..... ..... | 12 |
| $Sb_2S_3$..... | 3 |
| $PbO_2$..... .. .... | 40 |
| $HgSO_4$ cinnabar..... | 1 |
| Glue..... | 14 |

In these the splint of wood is replaced by a number of cotton wicks, as many as 200 sometimes occurring in a single match, these are closely platted together, and the whole impregnated with wax. The reason of their being so cheap now seems to be that a German named Letzer only some two years ago patented a machine which begins and finishes the match in one consecutive operation. Inventive genius has been exercised in designing machinery for making the splints. In the 1851 exhibition one of the most approved machines was capable of cutting 1,000,000 splints in four hours. About the same time there was a machine in Saxony by which 3000 splints were made per minute. Then a London firm patented a machine for cutting 2,500,000 per diem, and Messrs. Dixon & Co., of Manchester, patented in about 1853 a machine for producing 9,000,000 per diem. Now the best machines turn out from 10,000,000 to 16,000,000 per diem, a number which if put end to end would reach 600 miles. This machine is in use at the Greenvale Chemical Works, Glasgow, and was invented by a Mr. John Lex Long.



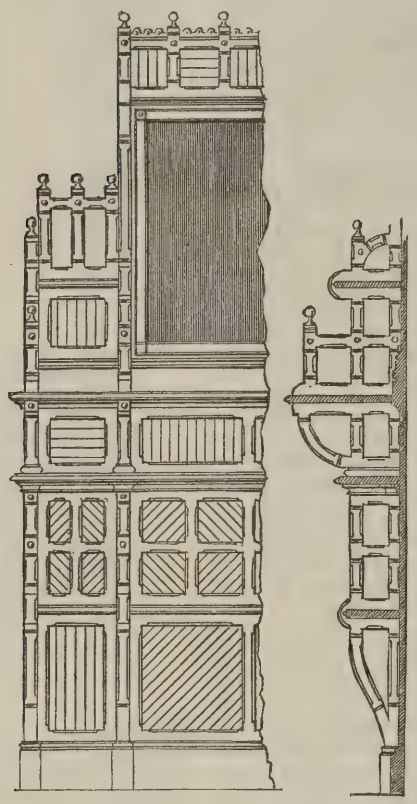
*Elevation of Dormer.—Scale, ½ Inch to the Foot.*



*Detail of Finish in Parlor.—Scale, ½ Inch to the Foot.*

**Wood Wool.**—For some time past attention has been directed to a very interesting product consisting of extremely thin and slender shavings of wood that are comparable to paper cut for packing. It is known by the name of "wood wool." This product was first introduced into France as a packing material. It weighs about 40 or 50 per cent. less than the materials generally used

for such a purpose. Its beautiful appearance, its fineness and its extreme cleanness at once brought it into favor with shippers. It was afterward found that the material was well adapted for the manufacture of mattresses, for bedding for cattle, for the filtration of liquids and for stuffing horse-collars, &c., the most suitable species of wood being selected for each of these purposes. Its elasticity causes it to be consid-



*Eight-Room Frame Cottage.—Detail of Mantel in Dining-Room.—Scale, ½ Inch to Foot.*

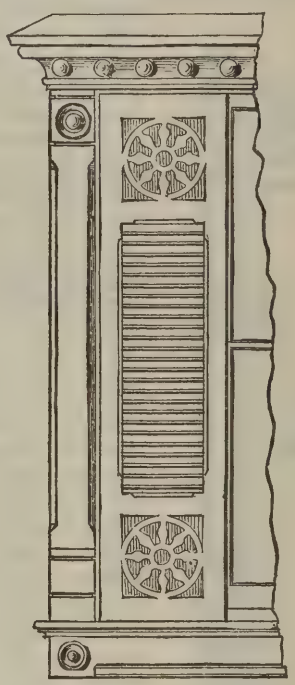
ered as the best material for bedding after horsehair, and it is even preferable to any other substance when it is derived from resinous wood, since it does not then absorb moisture. In workshops wood wool is tending to replace cotton-waste for cleaning machines, and it has likewise found an application on the rolling stock of railways for lubricating car axles. While it has the same property that cotton-waste has of absorbing oil it costs 10 times less than that material. Its use is said to be rapidly growing in Austria and Germany and also in France.

## Brick-Making in England.

At a recent meeting of the British Institution of Civil Engineers a paper on "Brick-making," by Mr. Henry Ward, Assoc. M. Inst. C. E., was read. Many different systems of brick-making were carried on in England. In some cases machinery was largely employed, while in others all the operations were done by hand. Similarly many descriptions of fuel and many kinds of kilns were used. It was impossible to lay down any general rule which would suit all places. Probably the system of manufacture in each locality was less open to improvement than manufacturers in other places were inclined to believe. Doubtless there was much that was open to criticism, but generally the plan adopted appeared to have been gradually adapted to the kind of clay and fuel and to the labor and transport conditions obtaining in each district.

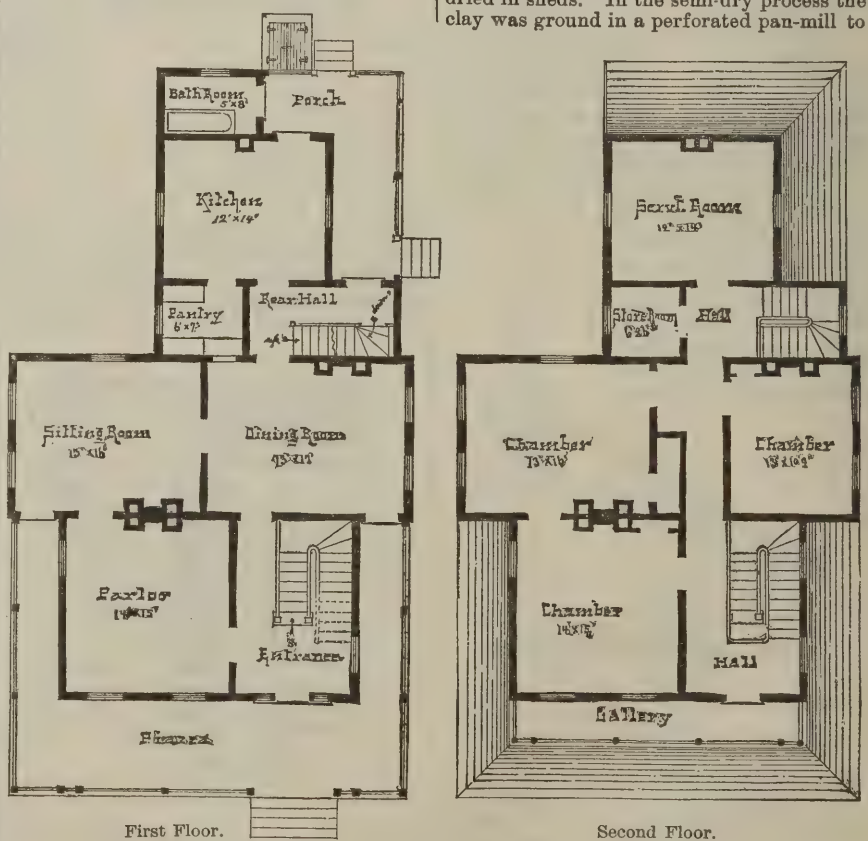
The process of brick-making by hand consisted in working the clay to a plastic condition, molding it, drying the bricks in the open air, and finally burning them in clamps or kilns. When burnt in clamps the fuel was generally house ashes mixed with the brick itself, but with kilns coal was employed. In hand brick-making as at present practiced machinery was utilized for the preparation of the clay. In the home counties the clay was first brought into a thin liquid in a wash-mill, where a certain portion of chalk was added. This thin liquid was pumped into "backs" or pits, adjoining the pug-mills, during the winter. The water gradually drained away, often to be used again, while the clay settled and became sufficiently stiff to be worked in the pug-mills in the succeeding summer. In nearly all cases the wash-mills, pumps and pug-mills were driven by steam-power. When the fields had a tolerably uniform surface it was found best to use long lines of shafting to convey the power from point to point. Where, however, the surface or the shape of the fields on plan was irregular it was preferable to drive the wash-mills and pug-mills by endless chains, running overhead and supported by small pulleys or posts at intervals. Probably the most important of the applications of steam-power was that of driving powerful force pumps, to force the liquid "slurry" through pipes up and down hill, sometimes to a distance of 2 miles. In this way bricks could be made alongside a railway, canal or river, while the clay could be pumped from a distance. In many brickfields all the clay had been worked out, but now that clay could be brought from a distance so economically the old plant could be utilized.

Brick-making by machinery might be roughly divided into two classes, namely, the plastic and the dry or semi-dry. In the plastic process the usual plan was to mix the clay and bring it to a soft state in a pug-mill, from which it was forced through a die or opening in the form of a column, the section of which was the same as that of a brick, viz., 9 inches wide by 4½ inches high, with a due allowance for shrinkage. This column of clay was divided into bricks by wires cutting through it transversely. The bricks were subsequently dried in the open air or in sheds heated by fuel or steam. There had not been any great alteration in the process of manufacturing wire-cut bricks. The machines were now made stronger and more complete, with crushing rollers, to enable them to deal with almost any kind of clay. The die or mouth through which the stream of clay issued required constant adaptation to particular clays to enable it to form a perfect column of clay. The difficulty was that as the stream of clay flowed quicker in the center and slower at the sides, similarly to a glacier or a stream of water, the sides and corners were apt to become ragged. This could be overcome either by putting friction on the center of the stream of clay to retard its flow, or by helping the travel of the sides and corners, either by lubricating them or by forming the sides of



*Outside Finish of Windows.—Scale, ½ Inch to the Foot.*

large rollers. These rollers were either rotated by the issuing steam or they might be driven by power faster, so as to help the stream. The use of the exhaust steam under hollow floors, covered with brick, flagstone or metal plates, had become general. By this means plastic brick-making could be carried on to a moderate extent through the winter, as the bricks could be dried in sheds. In the semi-dry process the clay was ground in a perforated pan-mill to fine particles without any admixture of water. This fine-ground clay was subsequently pressed into a brick, which was so hard and dry that it might be taken direct to the kiln without being previously dried.




*Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.*

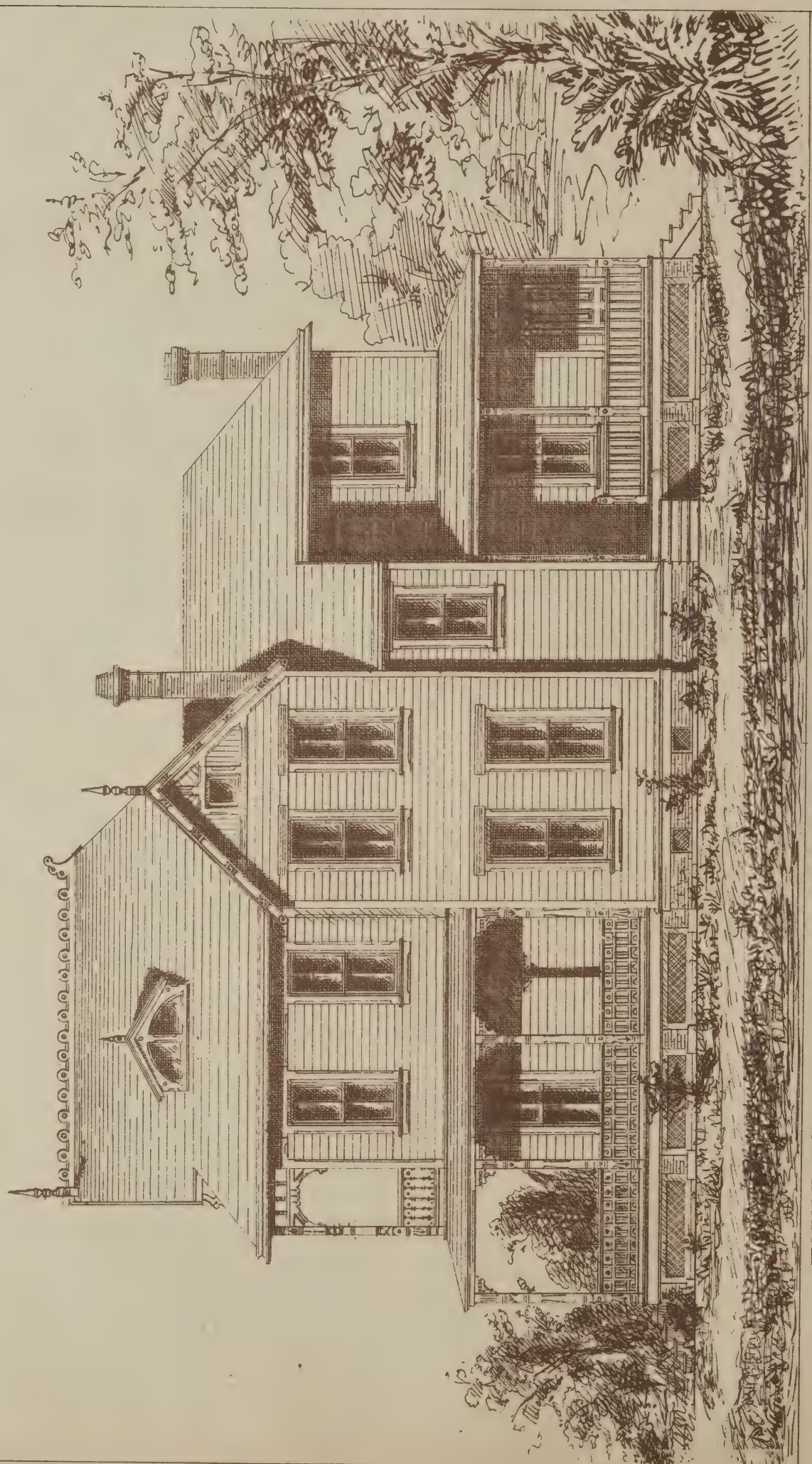
PLATE XXIX.

FRONT ELEVATION.—Scale ⅛ Inch to the Foot.

EIGHT ROOM FRAME COTTAGE.-DESIGNED BY H.E. PEIPERS, ST. LOUIS, MO.

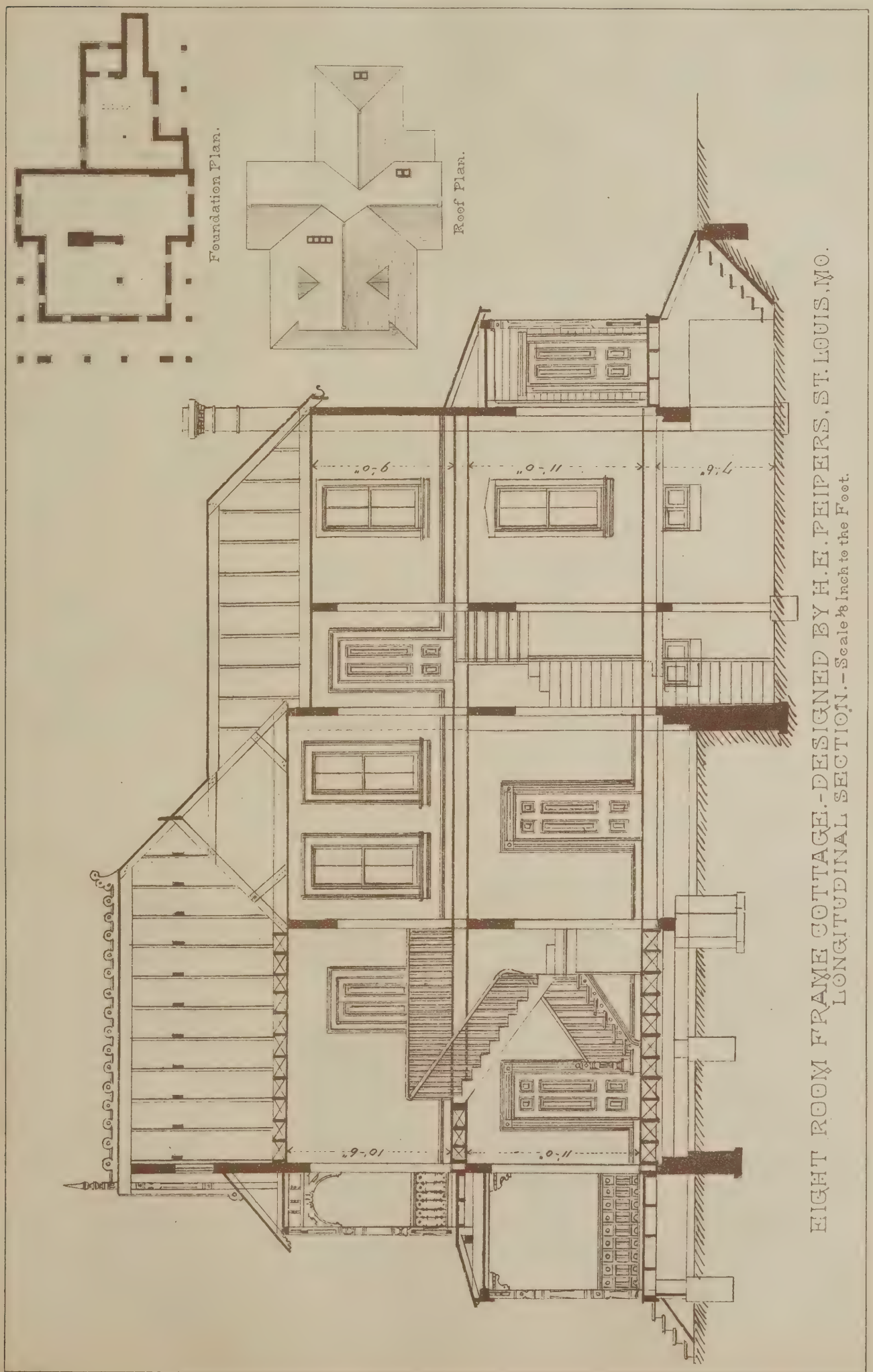
CROSS SECTION.—Scale ⅛ Inch to the Foot.

PLATE XXX.



EIGHT ROOM FRAME COTTAGE.-DESIGNED BY H.E.PEIPERS, ST. LOUIS, MO.
SIDE ELEVATION.-Scale ⅛ Inch to the Foot.

PLATE XXXI.




EIGHT ROOM FRAME COTTAGE.-DESIGNED BY H.E.PEIPERS, ST. LOUIS, MO.
LONGITUDINAL SECTION.-Scale ½ Inch to the Foot.

PLATE XXXII.

ELEMENTS OF STYLE.-EXAMPLES OF ELIZABETHAN AND JACOBEAN FURNITURE DETAILS. *

# CORRESPONDENCE.

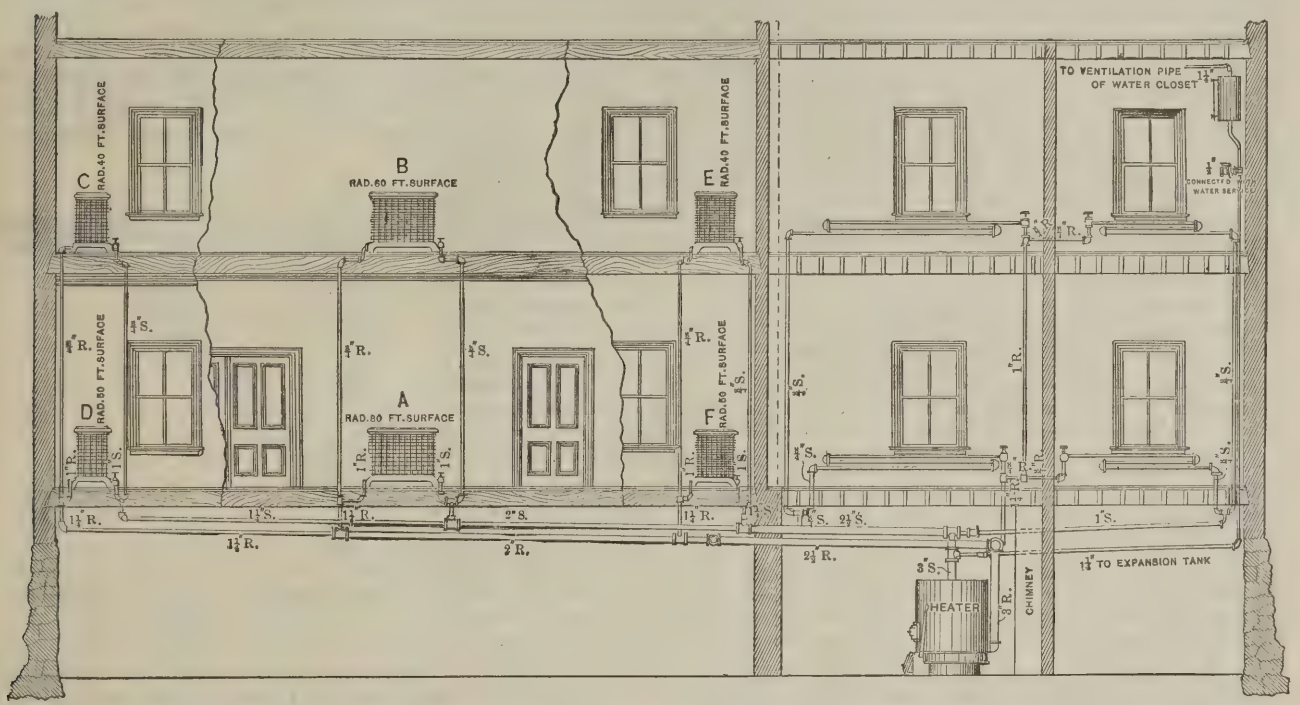
### Hot-Water Heating.

*From* L. S. DANIELS, *New London, Conn.*—Having been interested for the past 18 years first in the manufacture and later in the erection of heating apparatus, the writer has taken great interest in the articles which have appeared in the columns of your paper on this subject, and should the ideas here expressed seem of sufficient merit you are at liberty to publish them. The writer first came in contact with hot-water low-temperature direct-heating in 1877 in the British Provinces, where he was interested in the heating business for several years, and for some time was not convinced of its superiority over steam, neither does he think so now in all cases. Each has its merits under certain conditions, and it is the duty of a heating engineer, judging from past experience, to determine which method is best adapted to heating any particular class of buildings, but for heating hotels, residences and public buildings in constant use steam is not to be compared with hot-water circulation as a safe, simple and satisfactory method of heating. First, for reason of mildness of the heat. Second, because of its being susceptible of a great range of temperature. Between the 38th and 44th parallels of latitude the days are comparatively few when any heating apparatus need be run to its full capacity, if properly constructed, to give satisfactory results in the most extreme weather. Artificial heat is required generally in October or earlier, but very cold weather does not come till about January, and after February the need of heat grows less until June. There are about eight months in which artificial heat is required, but for about five months the need is for only a moderate temperature. Under the foregoing circumstances the most desirable method of heating is that which allows of the greatest range, other things being equal.

3. Safety is a matter of great importance, and with hot water there is none of the danger of fire which accompanies all hot-air furnaces, there being no pipes which could in any case become heated sufficiently to ignite wood.

4. A properly-constructed low-temperature hot-water heating apparatus is so simple that there is no need of the safety appliances that are found indispensable in low-pressure steam heating, the hot-water boiler being always open to the air, and, like a tea-kettle, will simply boil over. Heating engineers know to their cost the large proportion of users of steam heat in residences who are incapable of using judgment in the care of such apparatus, and often leave its management to servants who know little and care less about the matter.

In considering what constitutes a desirable hot-water direct-heating apparatus the first aim should be to get a properly devised and constructed boiler. This is the heart of the whole subject. From what has been written on the subject the inexperienced may have been led to suppose that a few feet of pipe coiled in the top of a stove or exposed to the fire in almost any shape is all that is required, but such is not the case. The coil boilers which have been referred to in your paper as in use in Canada are not generally constructed of coiled pipes, as might be supposed, but are formed of horizontal pipes set on a slight incline, and connected with headers or branch tees and return bends very similar to an ordinary box coil, with a portion of the pipes left out to form a fire-box, giving pipes on either side and over the fire. In many cases the grate also is formed of pipes which contain water. There are objections to this form of heater, one of which is excessive consumption of fuel. Another objection is a tendency to collect dirt, which is difficult to remove. A heater for heating by hot-water circulation should be of a construction that will collect the smallest amount of dirt possible and be accessible for cleaning, and the first requirement is of as great importance as the second. In ordinary




*Hot-Water Heating.—Planned by L. S. Daniels.—Fig. 1.—Vertical Section of Building.*

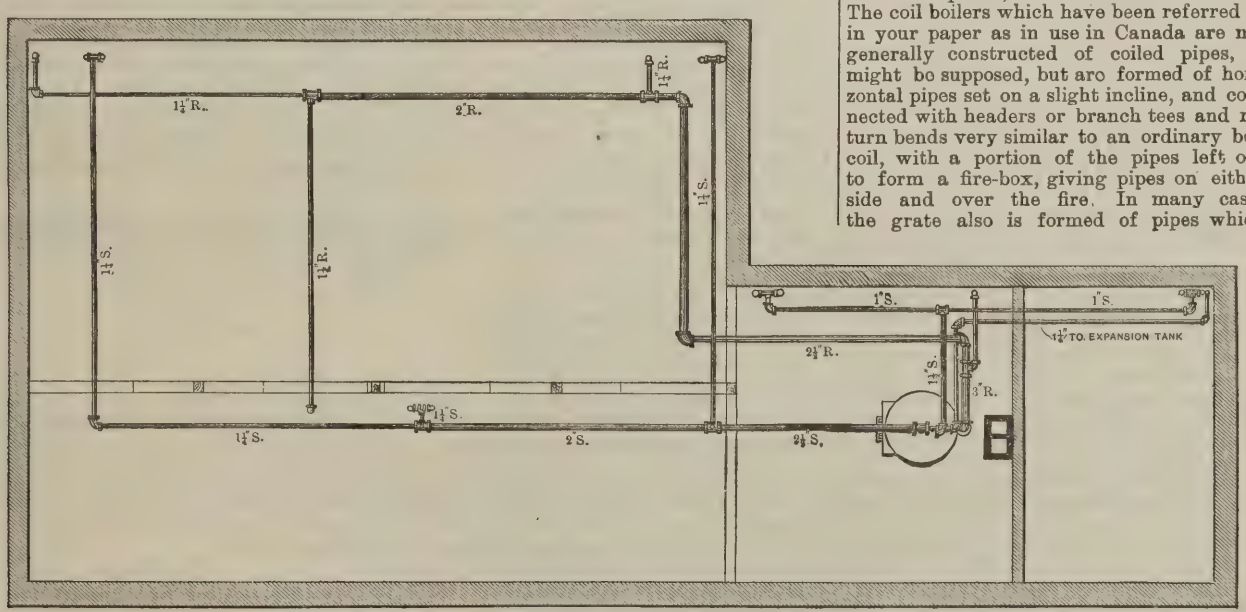



*Fig. 2.—Cellar Plan of Building.*

house heating little care is taken to keep the boiler free from deposits, and it is seldom that a heating boiler receives the care that is ordinarily given to one used for mechanical purposes. An illustration from personal experience will perhaps give a better idea of the general carelessness with which a heating apparatus for a residence is used than any other form of argument. Being called to look for the reason of the failure of a horizontal tubular boiler to give satisfactory results after one season's use, the house being filled with smoke, making it impossible to use it, although proper firing tools and tube-cleaners were furnished with the boiler, it was found that the tubes of the boiler were filled with ashes and dirt, on removal of which there was no trouble with the draft of the boiler. It was apparent at once that the boiler had been in care of a servant and the tube-cleaner never used. The ground the writer would take is this: A heating boiler, to give proper results, should be so constructed as to keep itself free from dirt as far as possible and at the same time have every part accessible for cleaning. This can be accomplished by using a boiler with flat vertical heating surface, the writer's experience being that a flat vertical surface will not collect deposits to any great extent by continual use, and boilers so constructed will remain in use for years and give good results.

The heating suface of a boiler for hot-water heating should be large to enable it to be so run that the products of combustion would not leave the boiler at a high temperature. The grate should also be ample, the fire carried deep, so that combustion will take place slowly. The heating surface over the fire should be much lower than where combustion is more rapid, as in a boiler for manufacturing purposes. In hot-water heating it is to be remembered that the whole system is dependent upon the principle that water expands when heated, and consequently becomes lighter, with a tendency to ascend and move the colder water before it. The current so formed moves slowly, and to assist a rap'd circulation the boiler should be constructed to allow the circulation to be vertical as far as possible. If a boiler in use for hot-water heating contains a large amount of water the circulation will not start so quickly as one with smaller capacity, but will not be so "flashy" and will retain its heat longer, and consequently will be more easily managed and give better results.

There is more difficulty in regulating the fire by an automatic arrangement with small boiler capacity than when a liberal amount of water is used. As to the radiation it should be ample to heat the building in the coldest weather to the desired temperature, and so arranged that the water will not boil in any part until the contents of the entire circulation reach that temperature. Referring to your issue of March, 1886, "H. W. C.," Redwing, Minn., has shown some original ideas, but an improvement may be suggested upon the arrangement shown in Fig. 2, same sheet. The illustra- shows ⅜-inch pipe to and from the expansion-tank. A steam fitter of large and long experience advised the writer long ago that less than ¾-inch pipe was unfit for any steam connection except to steam gauge, and experience has since shown that this was wise; and, as steam gauges are not used in hot-water circulation, he is convinced that smaller than ¾-inch pipe should never be used in this business. In place of the safety-valve on a steam-boiler low-temperature hot-water circulation leaves the overflow from the expansion-tank always open, and who would think of using so small a steam safety-valve as ⅜ inch. A number of years ago two houses in the same block were completed with direct hot-water heating apparatus and left with heat on at night. The expansion-tanks were made of copper, and they were connected in the corner of the bathroom in a manner similar to that shown in the cut referred to, except that ¾-inch connections were used. On visiting them the next morning one was found collapsed, and on taking down the overflow it was found to be choked with red lead, which, as the boiler became heated, the current had deposited at the highest point; when during the night the heat in the boiler diminished a vacuum formed, with the above result. Referring again to the article published in March, he says: "Where it is possible to divide the house into sections it is an excel lent plan to fit valves to control the sections. Occasionally valves are put on the coils, not for the purpose of shutting them off, but for the purpose of regulating the flow."

The writer would hold an apparatus far from what it should be if valves were ever necessary for any such purpose. The sketch of Mr. Ducolin, page 110, June number, shows that he has increased the size of the pipe leading to and from the expansion-tank to ¾-inch. This is better, but not large enough for a heater of any considerable size. He has fallen into another error. To use a steam fitter's phrase, he has "butted" his returns, for where the horizontal return pipes from the right and left meet with the vertical return-pipes they are shown to meet exactly opposite to each other. The result would cause an imperfect circulation, if not entirely stopping one side, probably the right, because of the greater distance of the circulation from the boiler. Whether this has occurred through carelessness or not it would lead the inexperienced into a grave error. It is also shown that he connects the coils with the supply at the top. This is the Canadian practice, but if one is to use either trombone or box coils let me suggest that he try the experiment of connecting his supply at the bottom. The writer's experience is that this is preferable, because when connected at the top with a slight fire there will be much more heat in the top pipe than lower down in the coil, showing a poor circulation, while if they are connected with the supply at the bottom the heat of the coil will be even throughout and more lasting, for, as the heat decreases in the boiler, the water will continue to circulate throughout the entire building as long as the temperature of the boiler is above that of the rooms in which the coils are placed. Having assumed the liberty to criticise what has been written by others, a cellar plan and a vertical section of a building are here submitted. They show the method practiced by the writer in hot-water direct low-temperature heating, of using pipe calculated to give an even circulation, and dispensing with valves for the purpose of controlling the flow of water. Since the sketches above referred to of H. W. C. and Mr. Ducolin show heating with coils, the rooms in the rear are shown similarly heated, the supply being connected at the bottom. There can be no objection to the use of trombone or box coils in hot-water heating, so far as their effectiveness in radiation is concerned, but they occupy much more space than radiators giving the same amount of heating surface, and space is always an item of consequence. Coils are unsightly unless concealed by screens, and these are expensive to provide and place.

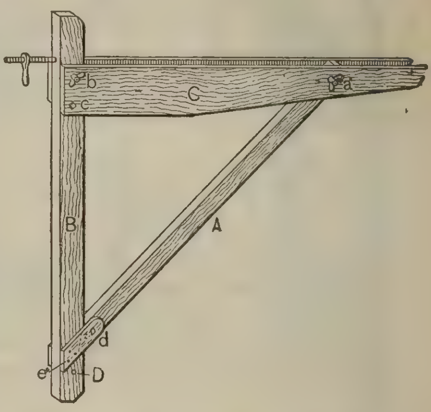
The radiators A and B are situated in the halls, and C D E and F in the four rooms out of the same. It will be seen that the supply is headed where any two risers are taken off; also that where a horizontal supply is taken off the main it leaves it on the top. A separate pipe is run from the first connection over the boiler direct to the expansion-tank, adding materially to the effectiveness of a low-temperature apparatus. No endeavor has been made to indicate a model heating apparatus by these drawings, but simply to show what experience has proved to be a proper method of connecting a hot-water boiler with radiation to give an effective and even heat.

### Barn Turn-Table.

*From* A. S. W., *Mystic, Quebec.*—I desire to say to "E. E. S." that I have a turntable in my barn that is exactly what he asks for. My barn is 12-sided, built in 12 sections, and allowing a space in the center of 30 feet open to the roof. It is lighted from above. There is a drive through one of the sections on to the table. The table turns the wagon as may be necessary to the different sections for receiving a load or unloading. When the work is done the table is turned, so as to permit the team to drive out the same way that they came in, thus avoiding the necessity of backing out, or having a long passageway through the barn, which causes waste room.

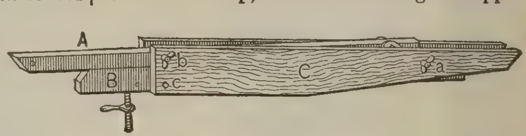
### Folding Staging Bracket.

*From* F. S. RITTER, *Laconia, N. H.*—I have obtained many valuable ideas from *Carpentry and Building* and my business has been benefited therefrom. I venture to inclose you drawings of a folding staging bracket of my own invention, which proves to be an article of great utility and benefit. The bracket when folded up occupies but little room, either when in transportation or in storage. The first sketch shows the bracket ready to be put on a building, and




*Folding Staging Bracket, Described by F. S. Ritter.*

the second the bracket folded up ready for shipment. I make the standard of 2 x 3 inch stock, 4 feet long; the brace 2 x 2 inches, and long enough to come flush with the top of the ledgers. The ledgers are 3 x 4 inches thick by 6 inches wide and 4 feet long, tapering off at the outer ends, so as to lessen the weight. On each side of the standard, at the seat of the brace, I put in a plate of band iron, fastened to the standard by a rivet and two No. 8 ⅞-inch screws. I bore a double hole in the foot of the brace and make a slot of it, through which I put a rivet. This allows the brace to slide out of its seat and to fold into the standard. I use common 2¾-inch carriage bolts through the ledger. Wing nuts on the bolts would be an improvement. I use a rod of Norway iron ½ inch in diameter for fastening the bracket to the building, and a cast-iron crank nut, as indicated in the drawing. When folded up, tho bolt fastening the upper




*The Bracket Folded Up.*

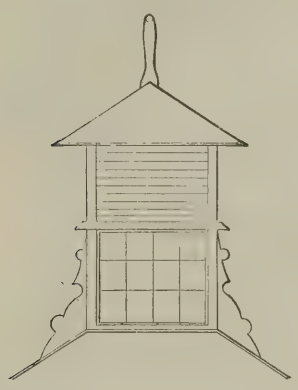
end of the brace goes through the ledger and the hole D in the standard. The bolt at the opposite end goes through the ledgers just above the brace, so that everything is fastened securely, quickly and neatly. This idea may not be entirely new to all my brother carpenters, but if any of them are in want of anything of the kind they are welcome to this.

### Construction of Limekilns.

*From* S. B. BELDING, *Appleton, Wis.*—A correspondent inquires in the December number with regard to limekilns. I advise him by all means to build what in this country is called the "patent draw kiln." There is no patent on it, by the way. A kiln of this kind makes from 325 to 400 bushels of lime every 24 hours. Old lime men in this region who have made the business a study for many years past adopt this kiln almost universally. I have built a number of kilns, and shall be pleased to correspond with any reader of *Carpentry and Building* about them.

### Octagon Barn.

*From* J. D., *Holyoke, Mass.*—I inclose you drawings of an octagon barn, which may be of interest to readers of *Carpentry and Building*. In explanation of the plans I would say that the first-story wall is of stone laid in cement. The first-story joists are of chestnut, and the other framing is of spruce. The hip rafters are 4 x 12 in section, bolted to the purlines. The windows of the cupola give light to the stairs and also

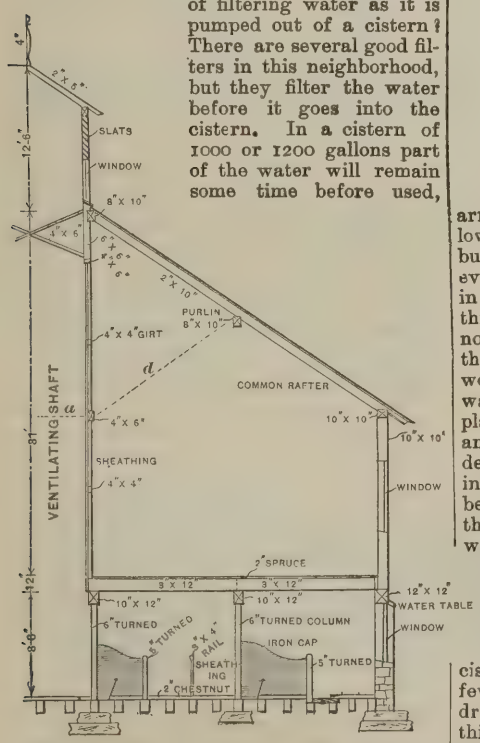


*Octagon Barn.—Cupola.—Scale, ⅛ Inch to the Foot.*

to the lower floor. The entrance to the hay floor is directly over the entrance to the lower floor or stable, and is in the shape of a bridge or incline. Hay can be thrown down through the ventilator and also in the passages. The track shown in the plan is for a dump-car to be used in cleaning out the stable. A track also might be laid in the feed passage, and a car used for carrying the feed. While the plans are before the readers of *Carpentry and Building*, I desire to inquire of those who have had experience in framing such structures whether it would be desirable to have a post to support the purline or a strut or brace, as indicated by the small *d* in the sectional view, provided the hips are bolted to the purlines.

### Filters for Rain-Water Cisterns.

*From* J. S. R., *Central, Col.*—Will some of the readers of *Carpentry and Building* be so kind as to let me know the best method of filtering water as it is pumped out of a cistern? There are several good filters in this neighborhood, but they filter the water before it goes into the cistern. In a cistern of 1000 or 1200 gallons part of the water will remain some time before used,



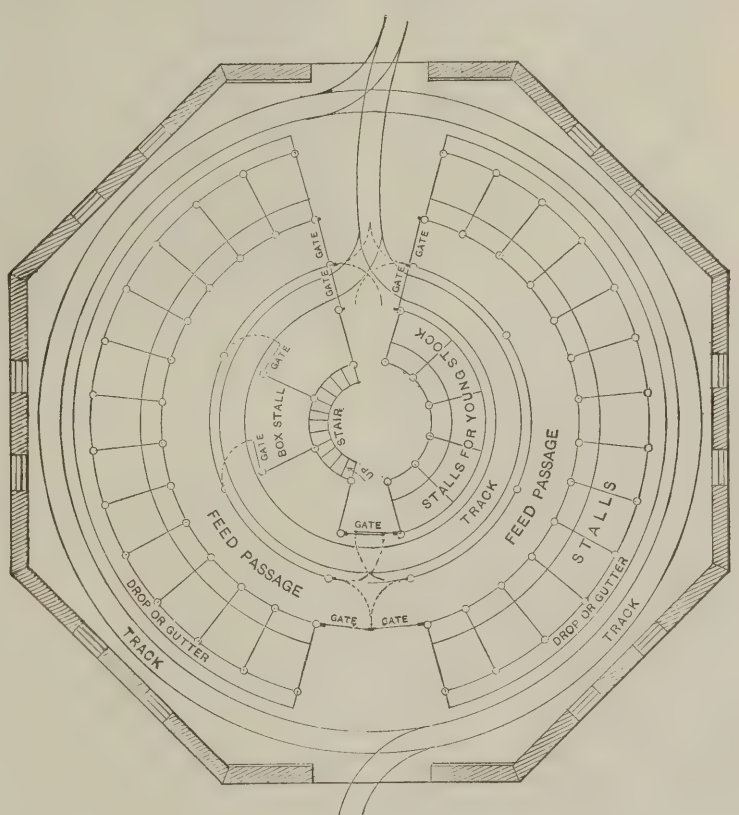

*Half Section.—Scale, $\frac{1}{16}$ Inch to the Foot.*

therefore I think it ought to be filtered as it is pumped out.

*Answer.*—Our correspondent accompanies his letter with a sketch of the cistern and filter for the inflowing water. The cistern is 6 feet in diameter and 6 feet deep. The filter through which the rain-water percolates before entering the cistern is 4 feet in diameter and 3 feet deep, containing layers, each 1 foot thick, of gravel, charcoal and sand, in the order named. If the cistern is ventilated and covered in such a way that no impurities can enter it from without, very little filtering, if any, is necessary before using the water. It is, however, always well to err on the side of safety, and, all things considered, we think our correspondent is right in desiring to filter the water a second time before employing it for domestic purposes. A simple means of doing this would be to build up in the center of the cistern a square shaft of brick, with cemented joints, and have the pump draw from this inner cistern. The shaft need not be more than a foot square at the inside, as the water will only be drawn from it occasionally, while the process of filtering is continuous. By this arrangement the water supply is never allowed to stand for any great length of time, but is renewed in part or in whole at every pumping. All solid particles suspended in the water will be removed by filtering through the brick, and, as there is little or no probability in the case considered of there being any impurities in solution, it would be all that is required to make the water perfectly pure and wholesome. This plan is capable of a number of modifications, any one of which would accomplish the desired purpose. Instead of building the inner cistern or shaft at the center it may be constructed at the side, and the wall of the large cistern made use of. Still another way would be to build a small brick dome r box at the bottom of the cistern and have the supply-pipe of the pump cemented in the top or at one side. If for any reason these plans are objectionable our correspondent might build at the outside of the cistern a small one having a capacity of a few gallons, and from which the pump would draw its supply of water. The capacity of this smaller cistern or reservoir would depend upon the amount of water required at one time. The pipe connecting the two cisterns should end in the larger one in a box packed with charcoal and magnetic oxide of iron or any other suitable filtering material. This box, open at the top, so as to allow of the free entrance of the water, would be accessible at the bottom of the cistern, so that the filtering material could be renewed whenever necessary. Perhaps a better way to connect the cistern and small reservoir would be by means of a short piece of large drain-pipe laid horizontal and packed with filtering material, the ends being covered

*Manner of Putting Together Plate and Purlin.*

with perforated sheet iron, or closed in any other way that would keep the contents from falling out. The means we have suggested for filtering the water a second time are not necessarily the best, and for the benefit of our correspondent, as well as for all others who may be interested in this subject, we hope that any of our readers who have plans to propose will do so.




*First Floor Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.*

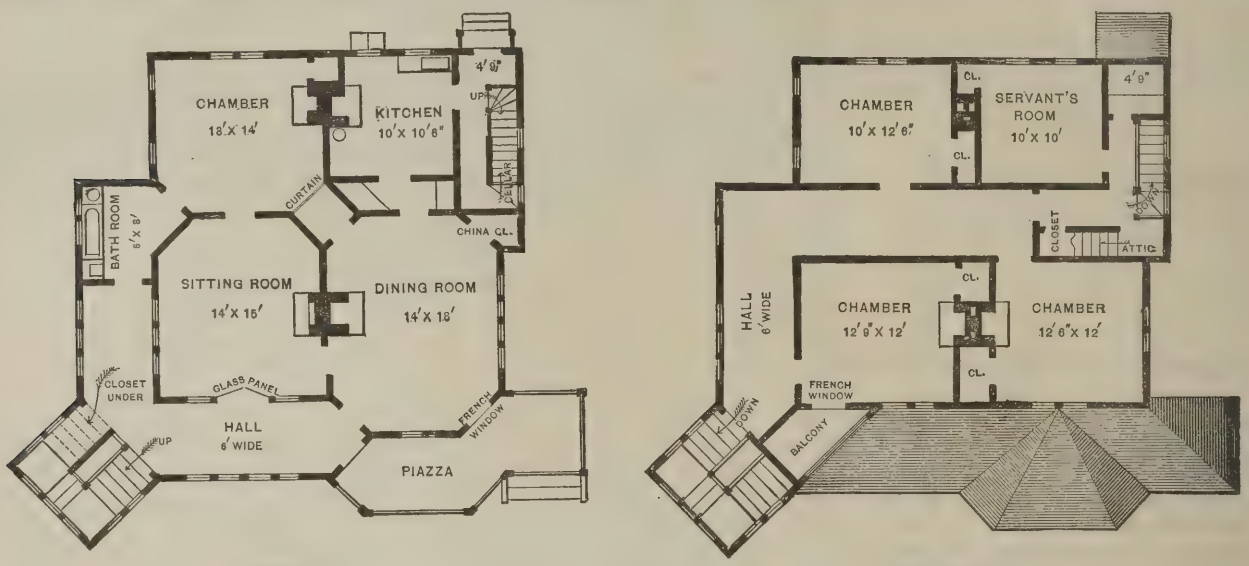
### Cheap Ceiling.

*From* J. O., *Deer Lodge, Wis.*—In the April number of *Carpentry and Building* a correspondent in the South asks about a cheap ceiling. If he had ever been in the West it would not have been necessary to ask the question. I will endeavor to explain how we are in the habit of constructing cheap cheilings in this neighborhood. We take heavy brown sheeting (cotton), and sew it together, making it 8 inches larger than the room. We use a strip of wood 1½ inches, beveled to an edge, around the room. We tack the sheeting over the thick or upper edge and on the back of the strip. We have another strip nailed around the room as a gauge against which to push the strip. We hold the strip up against the gauge strip and nail every 6 inches, using 4d. nails. Then on the opposite side we hold the strip up in the same way. The 8-inch surplus sheeting is pulled down behind the strip, after which we nail as before. By this management the sheeting can be pulled as tight as a drum-head. We then finish against the rafters or joist by nailing a half-round, so as to keep the cloth from flopping up and down. We kalsomine on to the sheeting, using any color to suit. The above construction is that which is com-

monly employed with wooden buildings. If, instead of kalsomining, the finish should be of paper, the border covers the beveled strip. This is Western construction, but it makes a good ceiling and a cheap one. There are objections to it, however. The hotel at Garrison was ceiled throughout in this manner. It took fire on the morning of April 5, and the minute the flames made an opening through the ceiling they spread like lightning all over the house and caused explosions like the firing of guns. I suppose this was due to the dust that had collected The kitchen referred to was plastered one coat on the inside and is still in a fine state of preservation. Where lime, sand and gravel can be had at small cost the method here described will make a warm and durable wall at small expense.

### Arrangement of Rooms.

*From* J. A. KING, *Everett, Mass.*—I inclose plans which I have prepared in answer to the question proposed by "J. H. W." I have no doubt objection will be raised to without masons having more or less frozen mortar on hand. I have frequently seen mortar chopped out of the bed with an old axe, and taken into a warm room or cellar to thaw out. No complaint was made on completion of the building that the work was defective on this account. I recall a case where the brown mortar for the entire job froze up solid and remained so until the spring, when the mason used it the same as though it had been fresh mortar. A good solid wall or ceiling can be obtained where the brown mortar is run on and allowed to



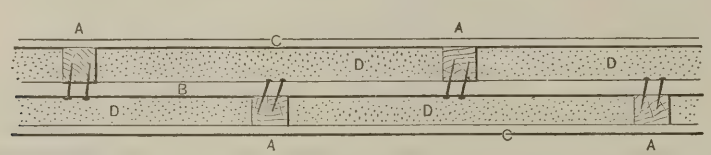

First Floor. Second Floor.

*Floor Plans Accompanying Communication from J. A. King.*

on the upper side of the ceiling. I am at present engaged in rebuilding the hotel, but have decided not to use cloth for the ceiling.

### Building Warm Houses.

*From* J. G. L., *Danville, Ill.*—In the June number of *Carpentry and Building* "H. W. G." describes a plan of grouting frame houses which he says is the best and most reliable one to make frame houses warm that is known to the trade in this country. I will submit my method, which I first put in practice some 18 years since. The first application was in building a kitchen one story high, with cellar under the same. On the foundation wall there was placed studding in the manner represented in the sketch. A shows studs 2 inches square. B a strip, 1 x 3 inches, while the space between is filled with grout. C represents the plaster lath. The strip between the outside and inside studs was nailed to each side at the bottom, and two similar strips




*Building Warm Houses.—Drawing Accompanying Communication from J. G. L.*

were placed above, one midway and the other at the top. These served to prevent the frame from spreading while being filled in with grout. On the outside and inside of the studs there were nailed plaster lath, with ¾ inch space between the lath. They served to hold the grout filling and were put in place with 6d. nails. The studs are placed 2 feet from centers inside and out. The advantage of this plan consists in the grout forming a continuous wall between the studding, leaving no cracks from shrinkage of studs and being ready to plaster inside and out. The plaster unites with the grout, forming a solid wall. In case there is decay of the studding the wall, having 5 inches of grout, will support a building for years after the studding has given out. The outside of the wall can be plastered or weatherboarded as preferred. The location of the sitting-room, but when the amount of light it receives is considered and the coolness without drafts, and the warmth in winter which it secures is taken into account, it will be seen that it is a pleasing novelty. Other features of the plan are left to the mercy of the readers of the paper.

*Note.*—The floor plans submitted herewith have several unique features. The sitting-room to which our contributor refers is completely surrounded, a hall or corridor 6 feet wide separating it from the outside. So far as surrounding the room in this way is concerned, the plan resembles that of Mr. Ingham, published on page 9 of our issue for May, save that in that case a bedroom was thus surrounded, while in the present instance it is the sitting-room. Our correspondent has a peculiar way of arranging his staircase, which is so placed as to warrant it being considered almost out of doors. There is a large amount of hall room also in the second story in comparison with the number of chambers. Our correspondent has sent us a perspective sketch of this plan, which unfortunately was not drawn to advantage for reproduction, and therefore we have not engraved it. The house, as our readers will suppose, is somewhat odd in external appearance, although not as peculiar as might be imagined from the floor plans.

### The Use of Frozen Mortar.

*From* B. S. H., *Evansville, Wis.*—It is amusing sometimes to notice the difference of opinion on a question that should be a matter of fact. I have been in the building business for more than 30 years, and yet I have never heard of such a thing as throwing away frozen mortar. In fact, hardly a season passes in this part of the country freeze dry, but in order to make a good job it must remain frozen until the moisture "freezes out," as the housewife says with reference to her wash on the line. This method is, of course, risky, because the weather is liable to sudden changes, and a warmer temperature would defeat the end in view.

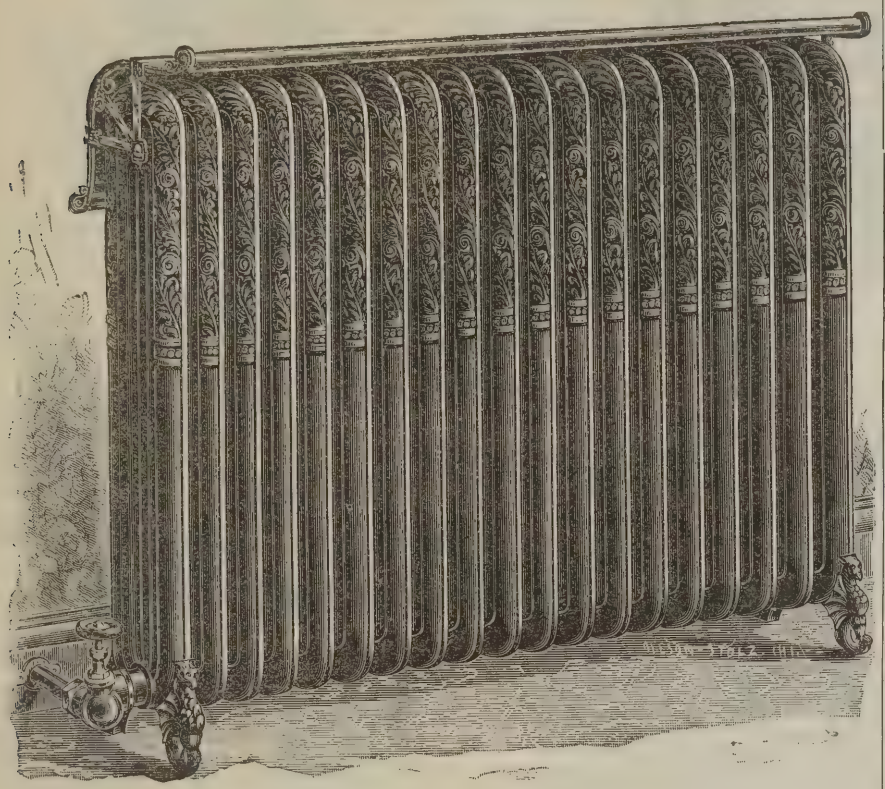
### Cutting Out Wreath-Pieces.

*From* E. G. A., *Ossian, Iowa.*—The note appended to the communication of "S. W. J.," in the April number, concerning method of cutting out wreath-pieces for stair-rails attracted my attention. If your correspondent intends to be understood as using a sheet-iron inclined support, cut to a quarter-circle of the same radius as the gauge-piece shown in the engraving, he is attempting an impossibility. If the quarter-circle of iron is securely hinged to the gauge-piece for the purpose of preventing lateral motion, and is then elevated 45°, or to an angle suitable for a stair with rise and tread of equal dimensions, the iron would overhang the plumb line or cutting of the saw one-half of its length. If it were raised to the perpendicular its entire length would overhang and would be extended away from the saw. It is possible that the sheet iron could be formed to the segment of a much larger circle than the gauge-piece A, and thus fill its purpose in the machine. The spiral line for hand-railing to continuous winding stairs is always the segment of a much larger circle than the horizontal cut of the cylinder around which it passes. Of course, where the rail meets a landing and an easement is formed, the continuous direction ends and the rail follows the line of an ellipse. Readers of *Carpentry and Building* may recall a communication sent by me in reply to a correspondent's request for a simple method of laying out the rail for circular stairs, which was published in the June number for 1880. The machine there illustrated, which was copied from the Patent Office Report of 1859, was designed for drawing the face mold to hand-rails for spiral or cylinder stairs. The device suggested by "S. W. J." seems very closely related to this; in short, it is a kind of twin brother, with one important exception, and that is the introduction of the quarter-circle.

# NOVELTIES.

### Hot-Water or Steam Radiator with Hood.

The Hay & Prentice Co., 34-36 South Canal street, Chicago, Ill., have recently placed on the market a new hot-water or steam radiator with hood, a view of which is shown in Fig. 1. It differs from the ordinary radiators of its class in the design and ornamentation of the loops, and dispenses with the usual top, which the manufacturers state is objectionable both on account of appearance and because it interferes with the free circulation of the air. In place of the ordinary top there is substituted a curved shield or hood which is fastened to the radiator by a bolt running through the upper part of the loops. The hood is movable and may be thrown to either side of the radiator for cleaning or dusting or for deflecting the heated air in either direction desired. When the radiator is placed at the side of a room the shield throws the current of hot air away from the wall and thus prevents it from injuring the wall paper, pictures, &c. The shield is of ornamental design and adds to the attractive appearance of the radiator.



*Novelties.—Fig. 1.—Hot-Water or Steam Radiator with Hood.*

### The Patent Diamond-Pointed Steel Screw.

The Russell & Erwin Mfg. Co., New Britain, Conn., and New York, are putting on the market the new screw shown in Fig. 2. These screws are referred to as being readily driven with a hammer their entire length into seasoned oak, maple, hickory or other hardwoods, and if greater holding strength be required it is explained that they may be partially driven by hammering and then turned to place with a screw-driver. The head is made convex to strengthen it and prevent its splitting when struck with the hammer. The thread is of the ratchet form, for the purpose of permitting its penetration without tearing the wood fibers. It is claimed that these screws hold much better than the ordinary wood screw driven in the usual manner, and that they can be easily removed with a screw-driver, regardless of the manner in which they may have been inserted.

*Fig. 2.—The Diamond Pointed Screw.*

### The Utility Wrench.

The Utility Wrench Co., No. 231 East Ninth street, New York, are just introducing a new wrench which has many interesting and novel features of utility and convenience. It is described as combining with great strength and durability an exceptional rapidity of adjustment and convenience in getting at the heads of nuts and bolts, couplings and set-screws in inaccessible places and where the mechanic can only use one hand. The mechanical principle involved in its construction is very clearly shown in Fig. 3. The locking is effected by an eccentric cam, held in place or released by a latch controlled by the thumb. When it is placed loosely over the nut the jaws are closed by pushing up the sliding jaw with the thumb. In this position it is securely locked; but, under any strain or pressure, the cam is easily disengaged by depressing the latch This permits of instantaneous and accurate adjustment under any circumstances. This tool is described as well made in all its parts, the materials used being tool steel and Norway iron. The sliding jaw is forged solid and machined out to fit the bar, thus avoiding any concealed flaws or other causes of weakness. It is stated to have been subjected to the severest tests for strength, and is highly commended by practical mechanics. The tool will be made in the usual variety of sizes, and all parts are interchangeable. The jaws are closed by a pressure of the thumb and released by depressing the latch; and a loose, snug or tight fit may be secured at the pleasure of the operator.

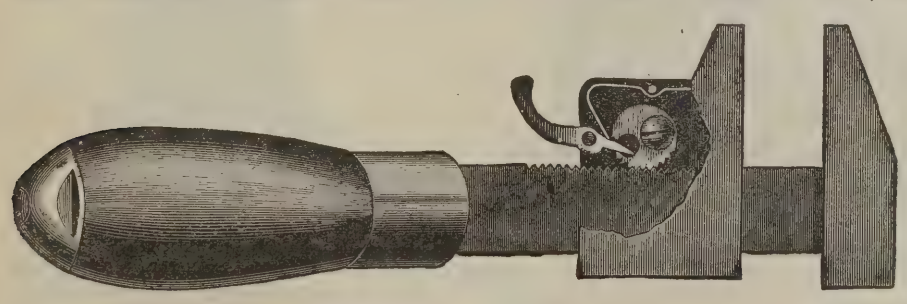


*Fig. 3.—The Utility Wrench.*

### Samson Door Hanger.

Fig. 4 represents a door hanger manufactured by the Medina Mfg. Co., Medina, N. Y. The hanger strap is described as made of heavy steel, corrugated, and it loops over the head containing the wheel, fitting rigidly in the same and clamping the head, which is of one solid piece, with a view to making it impossible for it to spread, and thus keeping the wheel from being displaceed. The axle-pin is made of drawn steel shafting, and is described as perfectly round, and the wheels are drilled and the pin driven in. Special attention is also called to the fact that the way or tread for this axle is broad, so that the axle has plenty of surface to run on, and cannot become lodged and cut a bearing place, as others are liable to do. In order to overcome the liability of hangers to spring open and allow the wheel to fall out or prevent it from running properly, the head of this hanger is made of cast iron, and then, to make sure of its having all requisite strength, the top is encircled with a steel strap, as above alluded to, the stiffness of which is greatly increased by the corrugation. The hanger as thus constructed is the result of much experiment, and is put on the market with the claim that it is exceptionally strong, easy running and durable. The general design of the hanger is attractive, as may be gained from the engraving above.

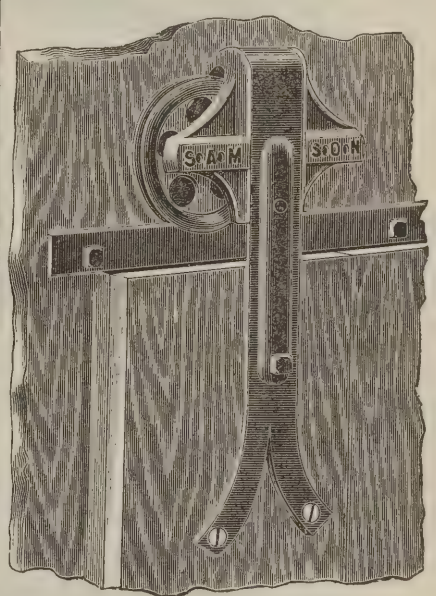
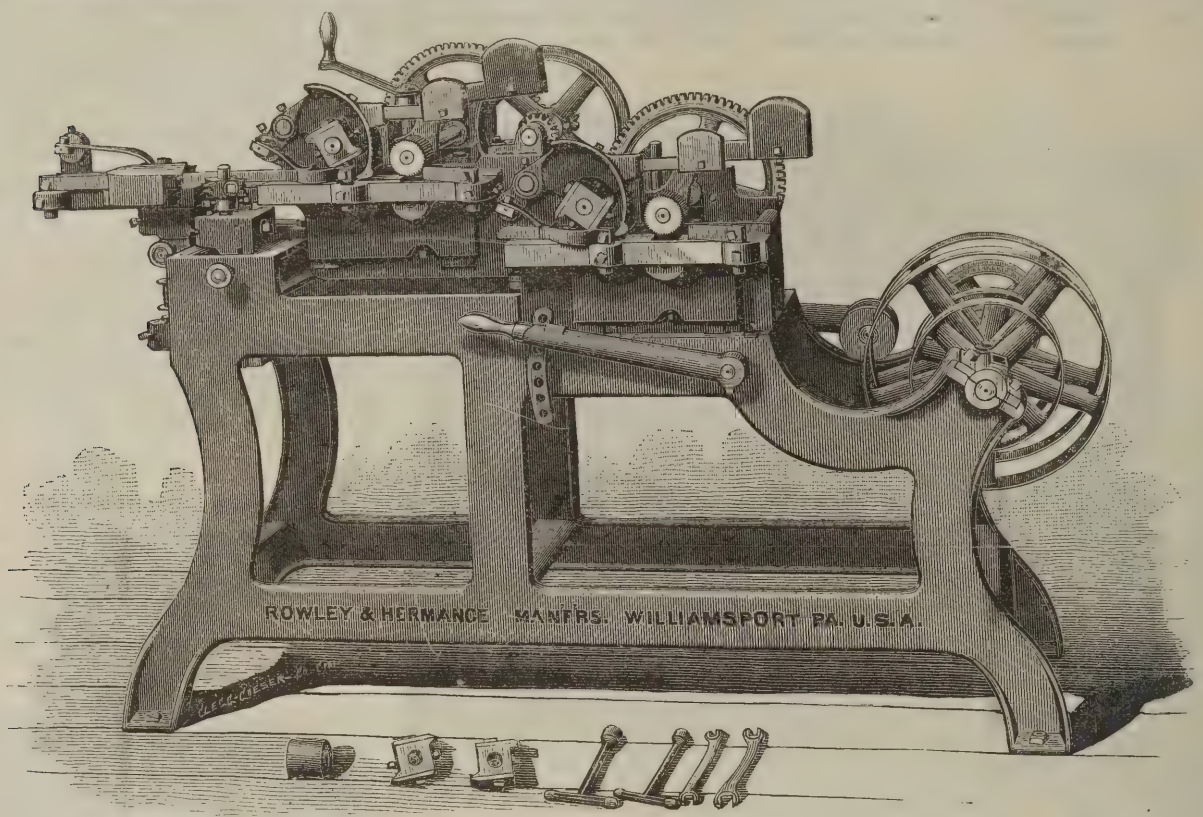



*Fig. 4.—Samson Door Hanger.*

### Double Blind-Slat Planer.

Fig. 5 of the accompanying engravings represents a new pattern double blind-slat planer which is being manufactured by Rowley & Hermance, of Williamsport, Pa. This is an improved machine for blind-




*Novelties.—Fig. 5.—New Pattern Double Blind-Slat Planer. Rowley & Hermance, Williamsport, Pa.*

makers that has just been put upon the market. As will be seen by the engraving, the frame is heavy and is cast in one piece. The machine is strongly geared, and is provided with a powerful feed. The side heads run with long independent belts from the counter-shaft. Objections which have prevailed in other slat planers are overcome in this. The makers state that where slats are finished in an ordinary four-side molder, with one head working against the grain, about one-third of the slats are left rough by tearing out or being wavy. These are very generally thrown away. In order to save this loss many manufacturers run their slats twice through the machine, so as to finish them with the grain. In this machine there is presented a means of planing the slats with the grain by once passing through, thus avoiding the loss of splitting and tearing out, as is the case when one side is run against the grain. Practically it amounts to two machines in one, having upper and lower tables, and two sets of double-geared feed rolls. The slat is run under the lower cutter or single head first, and then turned over and placed on the upper bed beneath the feed rolls, which carries it through the upper or three-sided machine, finishing the slat with the grain. The operator has time to grain his stuff when feeding. The machine is constructed with the Rowley & Hermance patent sliding-cap journal box, the advantages of which are generally appreciated by our readers. The machine occupies a space 6 feet in length by 2 feet 3 inches in width, and weighs 900 pounds.

### Improved Seating.

Figs. 6 and 7 of our illustrations show two of the novelties recently introduced by Messrs. C. B. Demarest & Co., of 257 First street, Brooklyn, E. D., N. Y. Fig. 6 represents different styles of seat backs, also different styles of seats, and more especially a hat-rack and a dry umbrella and cane holder. The latter is obtained by a slight bracket extension near the base of the frame of the seat, and is an improvement that will be very generally appreciated. The center seat of the three shown has a back that is made of veneer, and is of a style that is very popular at the present time.

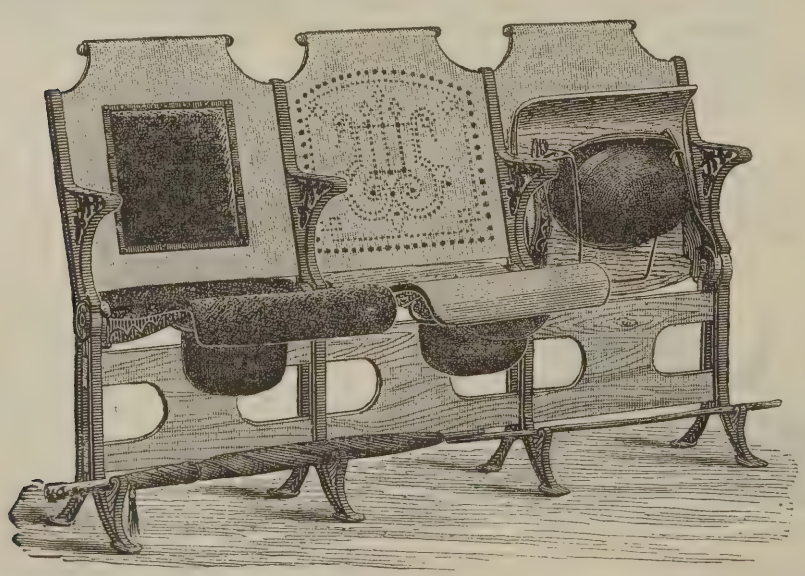


*Fig. 6.—Improved Seating, Showing Hat Racks and Dry Umbrella and Cane Holder.*

Fig. 7 shows a wet umbrella holder adapted for attaching to the ends of seats and pews. The rod at the top lifts and gives a space of from 3 to 4 inches to hold the wet umbrella. At the base of the pew is a cast-iron cup to catch the drippings. The cup is put on with sliding grooves at the back (not shown in cut), and can be removed and emptied. When not in use the rod at the top folds down. Still other novelties in seating are shown in a neat catalogue which this company have issued.

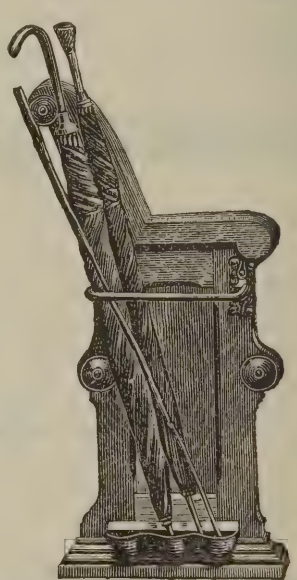
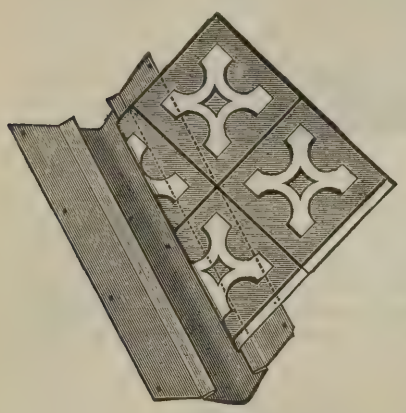


*Fig. 7.—End of Pew, Showing Wet Umbrella Holder and Cup.*

### New Corrugated Conductor-Pipe.

We have received from Gordon & Gilbert, No. 218 New street, Philadelphia, a full-length section of their new corrugated expanding conductor-pipe, which is manufactured by special machinery

which they have recently perfected and patented. The manufacturers inform us that this pipe is being offered to the trade strictly on its merits. They claim it to be the best pipe of its kind



*Novelties.—Fig. 8.—Cortright Valley with Shingles Attached.*

made, and are prepared to guarantee it in every particular. The length before us has two seams, being composed of three sections. The corrugations are very regular, and the piece of pipe is as straight as the most critical could desire. The joints between sections are made by peculiar indentation and interlocking that is at once effective and strong, and which unites the two pieces so thoroughly as to give the smallest amount of prominence to the lap. The longitudinal lap is in the form of a single lock, and the metal is pressed down so closely that the seam is practically invisible. In all respects the pipe is workmanlike, and we have no doubt it will give every satisfaction to the trade. We learn from the makers that they are manufacturing and carrying in stock all sizes from 2 to 6 inches, both round and square, and that they supply it either in the plain tin or with the tin painted both inside and outside, and also galvanized. It is supplied as may be required in 3 foot, 6-foot or 9-foot lengths. The sample that we have examined has been galvanized since it was made, and the galvanizing has been so perfectly done as to cement the abutting surfaces together very thoroughly, and make it practically one piece of metal from end to end.

### Roofing Specialties.

The Cortright Metal Roofing Company have established an office and factory corner of Broad and Race streets, Philadelphia. In Figs. 8 and 9 of the accompanying engravings their style of roofing is shown in a way to be understood by our readers. They are manufacturing a peculiarly shaped sheet metal shingle, and in addition a valley and ridging that are of more than passing interest to architects and builders in general. Their shingles have such a construction as admits of their being put in place in a

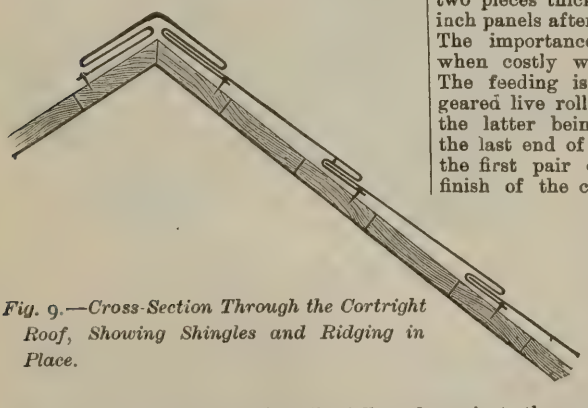


*Fig. 9.—Cross-Section Through the Cortright Roof, Showing Shingles and Ridging in Place.*

reverse way from that ordinarily followed with slate and other roof coverings. In other words, the work proceeds from the comb or ridge toward the eaves. This admits of the scaffold being built below the finished work and directly against the sheeting-boards in a way to avoid all danger of damage to the roof covering. This is especially advantageous on steep roofs, and would be of great service in roofing spires and other similar structures. The company are also manufacturing a ridging and valley which has in the past been more or less introduced to the trade, the construction of which facilitates the laying of metallic shingles in the manner above mentioned. Fig. 9 of the engravings represents a section through a roof with the Cortright roofing in place, and presents a section, also through the shingles, showing how the joining is made. Fig. 8 shows a section of valley and indicates means for joining the shingles against the valley.

### New Resawing Band-Saw Machine.

We show in Fig. 10 a new resawing band-saw machine just built by P. Pryibil, 461 West Fortieth street, New York, and which presents several features of interest to wood-workers. The machine, according to the builder, will saw from 12,000 to 15,000 feet per day of 10 hours, making a kerf of only $\frac{1}{16}$ inch or less, and getting from 1-inch stuff,

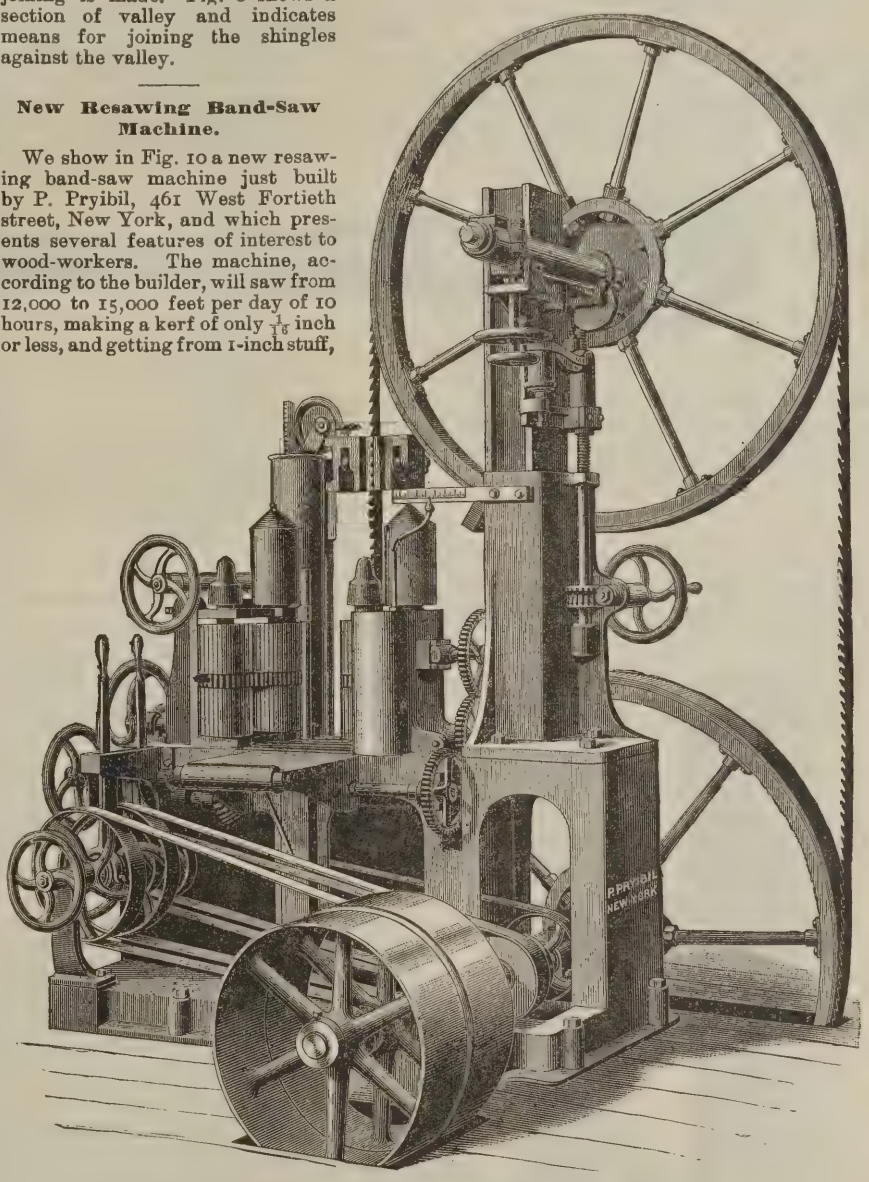



*Fig. 10.—New Resawing Band-Saw Machine, Built by P. Pryibil, New York.*

two pieces thick, enough to make two $\frac{3}{8}$-inch panels after being planed on both sides. The importance of this point, especially when costly woods are used, is apparent. The feeding is effected by four strongly-geared live rolls and two smaller idle rolls, the latter being so arranged as to guide the last end of the stuff after it has passed the first pair of live rolls and until the finish of the cut. Strong springs behind each of the bearings of the two feed rolls at the left of the saw hold these rolls up to the work and enable them to yield to all inequalities in the stuff. As either top or bottom of these rolls can yield independently or both together, a good bearing against the work is always insured, and the stuff is compelled to follow the guidance of the non-yielding rolls. Four rates of feed are provided, any one of which can be thrown into or out of operation by moving a hand lever and without belt shift ing. The saw runs between hardened-steel plates filled with dogwood plugs, with the end grain in contact with the saw, and each plate can be accurately adjusted by a single screw. The back of the saw bears against hardened-steel rollers which can be adjusted sideways as they become grooved from use. These rollers are also adjustable to different widths of saws, and are provided with self-oiling bearings. The upper guide is counterbalanced by a weight hidden in the guide-post, and is geared to a hand-wheel, by means of which its hight can be easily varied. This hand-wheel, the levers for changing the feed and the hand-wheels for setting the feed rolls are all accessible from the operator's position, and can be manipulated while the machine is in motion. The rims of the wheel are of bent ash, strong and light, and they overhang the ends of the bearings, which latter are self-oiling. The overhanging feature is quite important, effecting as it does the same result that some makers obtain by the use of outside bearings. The upper shaft can be angled while the wheels are in motion. It is carried on a slide cushioned upon an adjustable spring which maintains a proper tension on the saw throughout all variations of length due to change of temperature. This, it is claimed, renders the saw much more secure against breakage than the weights commonly used for this purpose, as the inertia of weights prevents them from yielding quickly enough when a chip gets between the saw and the wheel, the result being a broken saw. To provide doubly against such an accident a wooden block is so fitted in the throat between saw and wheel as to catch all chips and sawdust and discharge them beyond

the rim. The lower wheel is kept free from accumulations of sawdust by a scraper and the upper one by a brush. The body is a box-shaped casting in one piece, very strong and rigid, and it insures the permanent alignment of all the parts, The loose pulley is self-oiling, 1 inch smaller in diameter than the tight pulley, to slacken the belt when the machine is stopped, and it is provided with a step at the inner edge to cause the belt to shift easily. Fitted feed belts are furnished, and every machine is tested before leaving the factory. The weight of machine complete is about 6000 pounds, and the hight of stuff that can be sawed is 30 inches.

### Adjustable Spring for Sliding Blinds

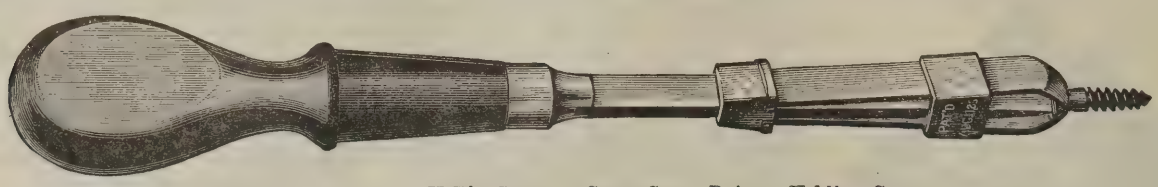
On page 110 of our volume for last year we referred to Willer's Patent Sliding Blinds, and described in detail the system under

*Fig. 11.—Adjustable Spring for Sliding Blinds.*

which they are manufactured. We also presented a number of illustrations showing styles and also details of construction. Fig. 11 of the accompanying engravings represents, two-thirds full size, the patent adjustable spring which is at present used in balancing the blinds constructed under this system. The pivoted friction-block at the end is of hardwood, and for it there is claimed better adhesive qualities than are possessed by metal. When the blinds are moved up and down it does not mar the surface of the guideways. The slotted plate lies under the spring, and is moved forward or back to increase or diminish the power of the spring. We understand from the manufacturer that this spring is warranted to always retain its strength and work satisfactorily, and where it fails he replaces it free of charge. This spring is used in the sliding blinds manufactured by Mr. Willer, and also in his sliding screens.

### Kolb's Common Sense Screw-Driver.

The screw-driver represented in Figs. 12 and 13 is made by G. F. Kolb, the patentee, 732 Sansom street, Philadelphia, Pa. Fig. 12 shows the manner in which the screw-driver holds a screw, so as to facilitate its insertion, and in many cases obviate the necessity of using a gimlet to make a hole for the screw. Fig. 13 illustrates the position of the attachment when it is desired to use the screw-driver in the ordinary way, without clasping the screw, as in Fig. 12. It will thus be seen that this article consists of a sliding attachment to a screw-driver of nearly the usual form, making a tool with a clasping device as represented. The object of this is that the screw may be firmly held in connection with the driver, permitting it to be started and driven in much less than the usual time, and without danger of the screw-driver slipping out of the slot or of the toppling over of the screw. It will be seen that a sliding band passes over the jaws, which when pushed down toward the screw applies a strong pressure which gives a secure grip. The manufacturer points out that this screw-driver is especially valuable for use in corners, overhead or in any place unhandy of access, a d alludes also to the advantage that results from having one hand free to hold the work while the other drives the screw. To drive the screw home the jaws are simply pushed back without stopping driving and without taking the driver out of the slot. The utility of the device in taking out a screw is also alluded to. The screw having been loosened with a few turns, the jaws are applied and it comes out easily, The point is also made that in driving a screw it is unnecessary to press against it as with the ordinary driver, because with this screw-driver one cannot lose hold of it, the pressing not helping it, as the screw once started needs only turning and it will draw itself in. This screw-driver is made medium size, total length 10 inches, the blade and jaws being of steel, with polished brass mountings and ebonized handles.



*Novelties.—Fig. 12.—Kolb's Common Sense Screw-Driver, Holding Screw.*

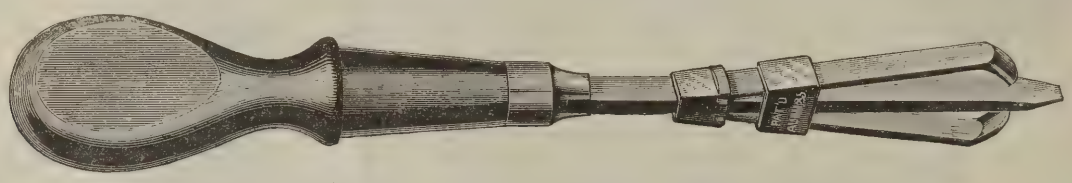


*Fig. 13.—Kolb's Common Sense Screw Driver—Attachment Not in Use.*

### Van Noorden's Improved Shingle.

A new form of sheet-metal shingle, the invention of E. Van Noorden, is just being introduced by E. Van Noorden & Co., No. 386 Harrison avenue, Boston. Fig. 14 of the accompanying engravings represents a single plate or shingle, while Fig. 15 shows four of the shingles joined together. By reference to the view of the single plate it will be seen that four boss-like corners are provided, which overlap in the process of laying, three of which are slitted or perforated, while the fourth is solid. The larger view shows how these are joined together and how the tongues of overlapping plates are drawn up through and bent over the slit in the lower corner of the upper plate. The boss that is left solid in the plate forms a tight roof covering at the point where there are four thicknesses of metal. Three of these are joined together by means already described over the boss, which forms

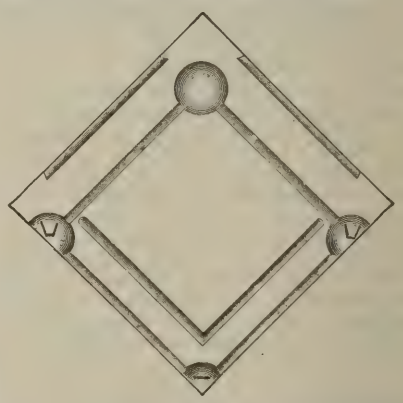


*Fig. 14.—General View of Van Noorden's New Roofing Plate.*

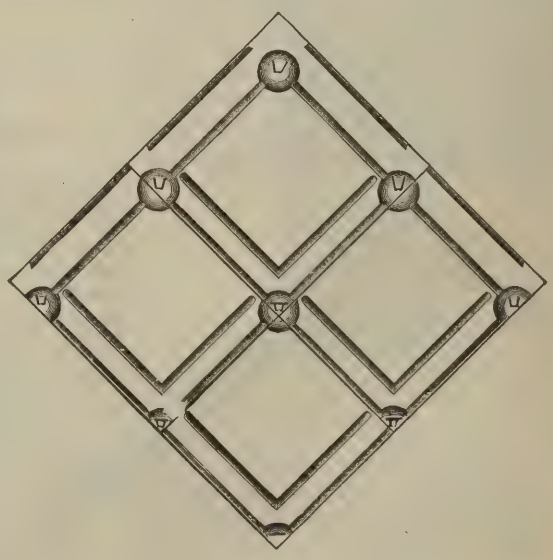


*Fig. 15.—Four Plates Joined, Showing Method of Interlocking.*

a weather-tight protection. The object of these features of the invention is to unite the different sections of which the roof is composed in such a way as to hold the lower corner of each tile in place and yet permit of contraction and expansion. The flanges and upper sides of the plates admit of nailing at those points. From this it will be seen that the shingles are thoroughly fastened in place throughout their entire surface.

### New Variety Woodworker.

Messrs. Cordesman, Meyer & Co., of No. 170 West Second street, Cincinnati, Ohio, are directing attention to a variety woodworker, the leading features of which can be gained from Fig. 16, of the engravings. The machine is of a character to be used for rip sawing, cross-cut sawing, jointing, hand planing, routing, mitering, beveling, paneling, grooving, molding, &c. The frame is massive, and the table, which is of iron, is very heavy. The counter-shaft rests on the extension of the frame, and is provided with an outside bearing in a way to insure firmness. The frame is long, making the belt from the counter-shaft to the mandrel so long as to avoid danger of the belt slipping. With reference to the advantages posessed by this machine, the makers direct attention to the fact that the different parts are not crowded together, but are so arranged as to be conveniently operated or changed, as desired, in the shortest possible time. The false table consists of two parts, and slides into the large table from opposite ends, and allows any size of head to be used. By reversing the sliding parts any size saw up to 16 inches can be used on the mandrel. The back slide can be quickly raised in hight up to 1 inch above the level of the main table, for jointing, &c. The table is supplied with two fences, which can be instantly adjusted to different angles. The mandrel, which is of steel, runs in long self-oiling bearings, and is raised and lowered on a swinging frame by the hand-wheel shown in the front. The swinging frame is arranged in a way to avoid jarring or vibration. The raising or lowering of the mandrel does not affect the tension of the belt. The boring attachment is shown at the side. This is raised and lowered by a screw and wrench handle. It is provided with a sliding table with an adjustable fence. Where desired an attachment for tenoning, with sliding table, is furnished with this machine. The machine is also made without jointing or boring attachments, or with one and without the other, as customers may direct.

### Universal Miter Machine.

Fig. 17 of our engravings shows a machine which is being introduced at the present time by L. G. Leffingwell, No. 55 Eighth avenue, Newark, N. J., and which is intended for the use of cabinet-makers, picture-frame manufacturers, carpenters and other wood-workers. As will be gained from the engraving, the machine is constructed entirely of metal. The bed, which extends across the top, is carefully planed,

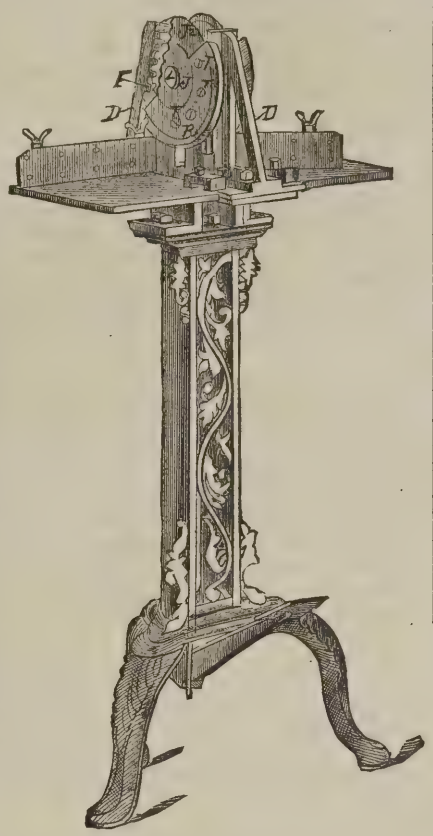


*Fig. 17.—Universal Miter Machine.*

and is provided with gauges, which are adjustable, so as to make the end of the machine either at a right angle to the material or at any lesser angle that may be required. The peculiarity of the machine is a shearing cut which is secured by the rotation of the cutting heads at the time of their descent. The machine is operated by a foot treadle, which is shown in the cut in the foreground. This connects with the cutters by a rod. In addition the movement of the head is influenced by means of a rack and pinion attachment, so that the blades in coming down revolve upon their axis, thus producing a better cut than would otherwise be secured. The blades are in the form of segments of circles, and are arranged on the opposite sides of the standards, forming a right and left cut, as clearly indicated in the engraving. The upward movement of the head is effected by a spiral spring attached to the treadle. The maker assures us that the machine is carefully made in every respect, and that the knives are highly finished. By this means accuracy is assured. Provision is also made by which any wear can be taken up. Different thicknesses of knives may be employed as the class of work may make necessary.

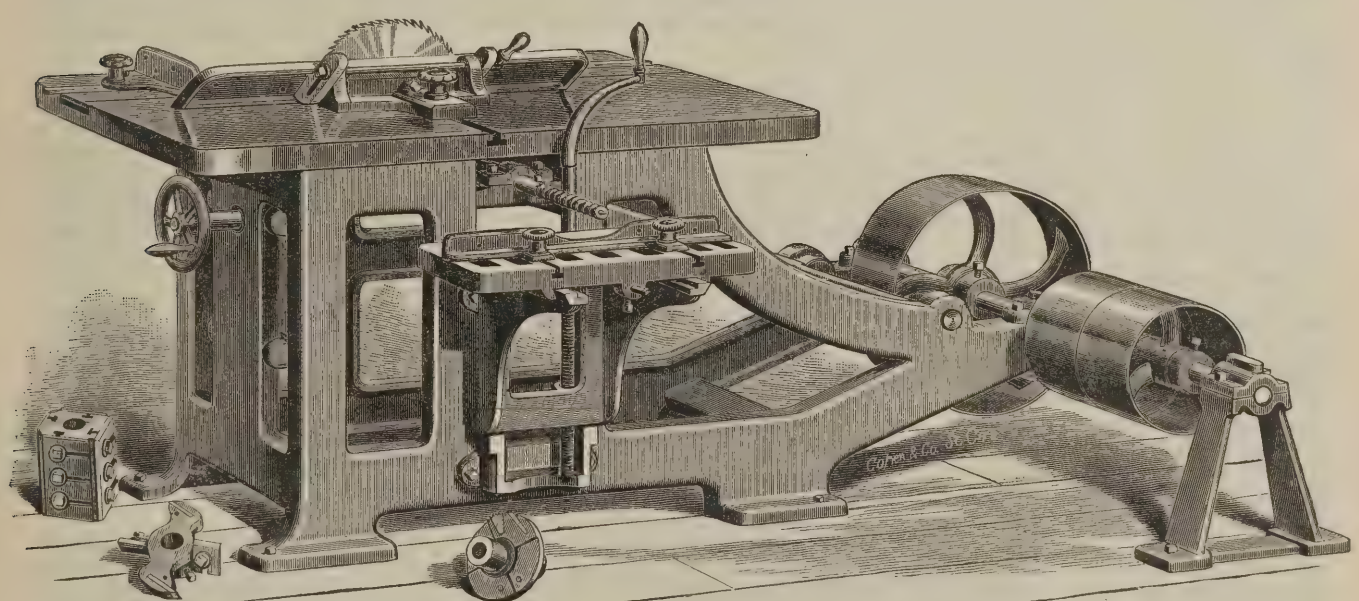
## NEW PUBLICATIONS.

Architectural Studies, Volume 1. Low-Cost Houses, Store Fronts and Interior Details, Stables, Seaside and Southern Houses, Out-Buildings. Large quarto, bound in cloth, 60 plates, with introductory descriptive text. Edited by F. A. Wright. Published by Wm. T. Comstock. Price $5.

The volume above described comprises the first five parts of the serial published under the general title of "Architectural Studies," some of the different numbers of which have already been reviewed in these columns. The book as prepared is in convenient shape for library use, and will be a desirable addition to the office literature of many practicing architects, as well as builders. The last number of "Architectural Studies," which reaches us at the same time, is entitled "Out-Buildings." It contains 12 plates, illustrating a windmill, wellhouse and wagon-shed, fences, gate-lodge, small stable, seaside pavilion, bathhouse, icehouse and various other auxiliary buildings.

### Shoppell's Modern Houses.

The third quarterly number of the serial bearing the above title was issued July 1, and is a great improvement over anything that has preceded it. It is issued by the Co-operative Building Plan Association, 191 Broadway, New York. This firm, from a small beginning, and in the face of inadequate plans, which characterized some of their first publications, have steadily gained ground, until they at present occupy a position commanding respect and affording a field of wide usefulness. The scheme upon which the business is conducted, is to present by means of this serial the perspective views and floor plans of dwellings, churches, stores, &c., and to afterward supply specifications and working drawings for a price that is stated in the list accompanying the designs. For example: The details in the work before us are priced from $15 to $250 per study. The present volume is a large quarto and contains about 70 pages. It has a colored perspective view of one of the designs as a frontispiece, and contains designs for 55 modern residences ranging in cost from $600 to $18,000. In addition a plan of constructing cisterns is shown, and the design for a small church is presented.



*Novelties —Fig. 16.—New Variety Woodworker, Built by Cordesman, Meyer & Co., Cincinnati.*

A chapter on the organization of Villa Park Associations is included, and designs of a stable and carriage-house are given. There is also the continuation of a reprint of one of Viollet-le-Duc's works entitled "The Inhabitations of Man in All Ages." The special feature of the present volume is a sheet of colored drawings for constructing a paper model house. This is issued in the form of a four-page supplement. The scheme is not unlike that of some of the toy houses that are arranged for the amusement of children. The house puts together in very good shape and very happily illustrates one of the designs contained in the book.

## TRADE NOTES.

THE CONTRACT for erecting the spires of St. Patrick's Cathedral, in New York, was awarded some time since to Messrs. George Nann & Co., of Baltimore. The marble to be used is to be shipped from this firm's works in Maryland. Marble from Maryland quarries was used for some 400 feet of the Washington Monument. The two towers of the Cathedral, when completed, will be 327 feet in hight, measuring from the sidewalk to the top of the cross. The contract calls for the completion of the work in four years.

IN OUR JUNE ISSUE we described new styles of sheet-metal shingles recently perfected by J. S. Thorn, of Philadelphia. Mr. Thorn has equipped a factory for the manufacture of these goods and is now prepared to fill orders. His card appears in another part of this issue. The shingles referred to differ from many others in the market, from the fact that some attention has been given to the architectural appearance of the work as well as mere constructive features. Three styles of the shingles are ready and afford a desirable variety for roofs, gables and siding.

THE DODD MFG. COMPANY, of No. 19 Park place, New York, invite architects, builders and house owners to carefully investigate the merits of the Dodd shutter-worker, which article is illustrated in their card and was also described among our "Novelties" some time since.

WE HAVE IN THE PAST referred to the special efforts made by Wm. E. Uptegrove & Bro., whose place of business is at the foot of East Eleventh street, New York, in the direction of popularizing mahogany for hardwood finish and cabinet-work. In their card, which occupies a full page in this issue, they present several reasons why mahogany should be specified by those who are about to build and who desire a fine hardwood finish. The firm invite correspondence from architects, owners and builders.

THE SMOKE AND FLAME which seem to be a prominent feature of the new cut forming Knisely & Miller's advertisement in this number are not to be considered as in any way referring to the fire which occurred in their establishment a short time since. The smoke is only a feature of the design, indicating in some measure the genesis of the material which they are employing. Their trade-mark, which represents a smith in active work, is shown in a little different form from anything that has preceded it, and occupies the central portion of the design. Referring to the fire in their works, above alluded to, while it was somewhat serious in character, it did not result in any delay to their business. Temporary quarters were secured and preparations were at once made for rebuilding.

THE NEW MANUAL TRAINING SCHOOL OF CARPENTRY, at Springfield, Mass., was opened for the short or vacation term a few weeks since. Lessons are to be given Monday, Tuesday and Wednesday of each week from 9 to 11 a. m., and from 2.30 to 4.30 p. m. The instructor is George B. Kilbon. The vacation class is limited to 24 pupils, who are divided into two sub-classes, one receiving instruction in the forenoon and one in the afternoon. Twelve benches are provided and are complete with vises and the different tools required in the work. The training school proper will open early in September, and six classes of 12 each have already been arranged.

A WROUGHT-IRON FENCE, which is described as a "punched rail fence," is being manufactured by Mast, Foos & Co., of Springfield, Ohio. One design is shown in their card which appears in this number. The fencing is suitable for private residences, parks, courthouses, cemeteries, &c. The firm offer an illustrated catalogue to all applicants.

THE GORTON BOILER MFG. COMPANY, LIMITED, with office at No. 110 Centre street, New York, are calling attention to the Gorton improved house-heating steam generator. The boiler in its features is described as wrought-iron tubular and sectional. A view of the apparatus appears in the company's card which is published in another column of this number.

CHAS. A. STRELINGER & Co., of Detroit, Mich., recognizing the season of the year and appreciating the disinclination of people generally to exert themselves, refer the readers of this paper to their advertisements which have appeared in the last few numbers, and say in explanation that "it is too hot and dry to write new 'ads.'" In passing they make a pleasant allusion to what they have recently published as being appropriate for "light" summer reading. We leave our readers to determine the correctness of this assertion.

W. P. WALTER'S SONS, No. 1233 Market street, Philadelphia, announce as a specialty the most approved tools. They are catering to the wants of mechanics who appreciate fine tools. They call attention in their announcement to an illustrated catalogue which they are ready to send to applicants.

SYMES & DONALDSON, of New York, announce that they have opened a store at No. 10 James Slip, corner of Water street, where they will carry a full line of Joseph O. Colladay & Bros.' wood-working machinery. They are the New York agents for the firm mentioned. In addition to this special line of machines they have on hand, in good order, a large variety of wood and iron working tools, together with engines and boilers of different sizes, shafting, hangers, pulleys, &c.

THE NATIONAL SHEET METAL ROOFING COMPANY, of this city, have just occupied a new office which has been erected in connection with their works in East Twentieth street. The ceiling of the office is made of Cusack's patent ceiling plates, of a handsome and appropriate design, while the cornice or frieze is formed of tile plates of Cooper's invention. One end of the office has been shingled with Walter's shingles of different sizes, illustrating in a very satisfactory manner the appearance of this form of roofing. The walls are of wood, stained to imitate cherry, and the floor is neatly painted. The appointments of the office are very complete, and in all respects are in keeping with the standing and enterprise of the company.

J. B. SHANNON & SONS, No. 1020 Market street, Philadelphia, invite the trade to send for a catalogue of builders' hardware and mechanical tools, which they have prepared for general circulation. They also offer to furnish estimates on work the specifications for which are submitted.

THE MEMORANDUM-BOOK issued by the Scribner-Libbey Company, of St. Paul, Minn, for the current year contains a calendar for 1886 and the first six months of 1887. A brief description of the goods made by this company is contained in the pages preceding the memorandum part, and also in the pages following. Four advertising pages are also introduced in the center of the book. Among the goods specifically mentioned we note galvanized-iron cornices and window caps, fire-proof doors and shutters, corrugated conductor-pipe, spiral lock-seam pipe, Byar's cellar window guard, adjustable elbows, corrugated roofing and siding and Hayes's skylights. The last cover gage is devoted to a card describing the machinery and millwork, which is performed in another branch of the Scribner-Libbey establishment.

THOSE WHO HAVE FOLLOWED the statistics of foreign trade the last few years have noticed that in some directions our exports have increased rather than diminished. This has been the case especially in improved machinery of various kinds, for which our makers are pre-eminent. The low prices prevailing in the United States the last few years have induced enterprising manufacturers to seek foreign markets, and in many instances they have succeeded so well that they are at present making arrangements to engage in this trade to a much larger extent. Among those who have been taking advantage of these conditions and making themselves felt in foreign markets are the Egan Company, of Cincinnati. We are informed that their foreign trade has grown to large proportions, and that it now constitutes about 12½ per cent. of their entire manufacture. Foreign users in the past in most cases have been buying English goods, but American manufacturers are at present so far ahead of their English cousins in the quality of the machinery they are offering, that they have no difficulty in disposing of their product even at a higher price than demanded for English goods.

WILLIAM WILLER, Fourth and Cedar streets, Milwaukee, in describing Willer's patent inside sliding blinds, refers to them as the only sliding blind having rolling slats in any or all sections. The slats are operated without the usual rod in front.

J. M. STUTZMAN, of No. 181 William street, New York, is offering to carpenters and other mechanics a complete line of steel alphabets, burning brands, stamps, &c., adapted for marking tools and other similar purposes.

W. HASKELL KING, of Guilford, Conn., is directing attention to a line of window and door hardware, which in part is illustrated in his card which appears in another portion of this issue. There is also illustrated a special bit gauge which this maker is putting upon the market. The special goods illustrated include a sash support bolt, a burglar-proof sash lock and a burglar-proof door bolt.

THE WORKS of the New York Terra-Cotta Company, at Ravenswood, Long Island City, were destroyed by fire on Saturday evening, July 17. The largest building belonging to the concern, being 80 x 150 feet in size and six stories in hight, was completely gutted, although the walls were not thrown down. The machinery, stock and fixtures in it were destroyed. The origin of the fire is difficult to determine. It is possible that it originated from one of the four kilns which were lighted. The conflagration has also been charged to the carelessness of plumbers who were at work in the building. The works were built last spring and had been in operation only a few weeks. Over 100 men are thrown out of employment. The loss is about $100,000, covered by insurance. We understand that it is the purpose of the company to rebuild.

F. O. NORTH & Co., of Boston, Mass., are directing attention to their automatic blind awning fixture, which is now sold by the hardware trade generally. The fixtures are applicable to either old or new blinds, and afford the chance of using the blinds in several different positions.

IN OUR DESCRIPTION of the improved carpenter's gauge, which appeared in the last number of *Carpentry and Building*, the printer made us talk about a "bead" as a portion of the tool, when it should have been "head." Gauge "bead" makes no sense, while gauge "head" will be readily understood. The substitution of a "b" for an "h" explains the error. Our practical readers no doubt noticed the mistake and made correction as they read the article.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

VOLUME VIII. NEW YORK, SEPTEMBER, 1886. NUMBER 9

## NOTES AND COMMENTS.

IN ANOTHER portion of this issue we present an interesting communication from a very bright and enterprising young mechanic, entitled "Laying Out Rods." Our contributor presupposes some acquaintance with the instrument, a number of applications of which he illustrates. His explanations are not so complete in all parts as perhaps some of our younger readers would be glad to see. His drawings tell more than the descriptive text, and a careful study of the illustrations will not fail to pay those who are of an inquiring turn of mind. The best plan, perhaps, for investigating such a subject is to undertake practically some of the work shown, and this, we suggest, will be an excellent thing for many of our younger readers to do. In the course of our contributor's letter he refers to the use of the rod in laying out circular shapes, and introduces sketches of irregular truncated cones, and shows the application of the rod to their construction. Some of our readers may perhaps be curious to know where such shapes could arise, and it may occur to them that they are introduced simply for the purpose of illustration and have no practical bearing upon the subject. Such, however, is not the case. The shapes in question were employed in the construction of the celebrated fountain at St. George's, Staten Island, which is illuminated by electric lights, and which by its rapid changes of colors is nightly delighting vast crowds of people.

THE FOUNTAIN consists of a number of jets, which instead of being thrown straight in the air converge to a certain point. Below each of the jets an electric light is placed, and the peculiar shaped tubs, to which our correspondent makes passing allusion, are employed about the jets for the purpose of focusing the rays of the electric lights and causing them to take the same direction as the jet. At the bottom of these forms, which for lack of better name we have called "tubs," a glass bottom is placed, and below this the electric light is situated. Colored glass slides are shifted from time to time between the lights and the glass bottom of the tub. With 14 or 15 jets of water thrown to different hights, the maximum being about 60 feet, and with the rapid changes of colors and the bright lights secured by the means above described, the effect is very brilliant and is one that has to be seen to be appreciated. Our correspondent was employed on the work connected with the fountain, and in all of it used his laying-out rod to great advantage. The fountain is based on an English patent, and, so far as we know, the one at St. George's is the only one that has been built in this country.

LIQUID fuel is still made the subject of much discussion, especially in England, where the advantages to be derived from its successful use have been very extensively recognized. As a practical substitute for coal, however, for steam raising, the introduction of the fuel has repeatedly been shown to depend largely upon the question of cost, and it is to this, therefore, that attention should now be principally directed. The available source of supply and the means and expense of delivery of the oil to points where it is to be used figure very prominently in the question of economy, a fact which seems to have been overlooked in many cases where trials have been made. The causes of the disappointing results are therefore at once apparent. Under the circumstances it is a matter of general interest to note that in Southern Russia, where the experience with the oil has been probably more extensive than in any other quarter, the matter of cheap transportation facilities is being carefully considered, and there is a promise of early developments which will have an important bearing on the petroleum industry there. It is more than probable that Baku, the principal source of the petroleum supply, will be connected with Batoum, on the Caspian Sea, by a pipe line especially intended for conveying the fuel and furnishing it to consumers at a price much below that now ruling. After what has already been done in that quarter in applying the oil in steam boiler furnaces it is not difficult to see what the effect of the proposed undertaking will be. Steam users generally will have reason to closely watch the developments, and should find in them some things of interest and profit to themselves.

IN HIS effort to prove to the workman that "capital" is something very different from what he thinks it, Mr. Andrew Carnegie is not, we think, quite successful. His article in a recent issue of the *Forum* has attracted much attention and has been widely quoted, but so far as we are aware no one has yet pointed out the fallacy in its line of reasoning. It really proves nothing to show that the great capitals which control all the distributive and many of the productive industries of the country are made up of the savings of a great many people. Out of the 19,340 holders of stock in the Pennsylvania Railroad, or the 10,418 holders of stock in the New York Central Railroad, very few have any more control of the management than have an equal number taken at random from the 47,000,000 who do not own stock. They may attend the stockholders' meetings and vote at the elections, but the controlling interest has its own way and will give the individual shareholder such a participation in the net earnings as the officers and directors see fit to agree upon. The individual stockholders have put their savings into a pool, and the vast capital thus aggregated is used as those representing the controlling interest may direct. If capital thus accumulated is so used as to oppress the public in any way the wage-earner suffers and resents the injury. He has no quarrel with the individuals holding a few shares, or with the widows, orphans and estates appearing among the stockholders, and it never occurs to him to condemn them. He knows better. But when he sees men who by the use of these accumulated savings of others build up colossal fortunes for themselves, and with these fortunes secure controlling interests in properties which other thousands own and have helped to create, he recognizes that there is an immense difference between capital and labor—and so, for that matter, do small shareholders who are not capitalists.

WE HAVE no doubt that the terms "capital" and "labor" have been used in the discussion of social problems with a good deal of unscientific looseness. But they have gradually acquired a reasonably definite meaning. The suggestion to substitute the word "savings" for capital would only confuse the discussion still more. How shall we classify under that head the oceans of "water" which have diluted legitimate investments in enterprises owned by stock companies? Are the millions of dollars of elevated railroad and Western Union Telegraph stock which have been created by vote of boards of directors' savings? They may be the means by which the savings of the credulous public are transferred to the control of men already millionaires. Perhaps they are not capital, but they demand annual interest and entitle the owners to participate in earnings, if any are reported, and appear as capital on the records. Capital may not be the tangible something which many wage-earners seem to imagine it, but it is a force with unmeasured potentialities of wrong and oppression when employed by unscrupulous and selfish men for their own advantage.

WE THINK it safe to predict that if the war now in progress between the Knights of Labor and the trade unions is continued it can have but one end—the defeat of the order which seeks to monopolize the control of organized labor. Trade unions are the legitimate outgrowth of the co-operation for mutual advantage of those who follow a common occupation. They had their beginnings centuries ago in orders and guilds, and have adhered to their original purpose as well as was possible under the changes which have taken place within the past century. The order of the Knights of Labor is purely artificial. It grew out of no recognized necessity, and seeks the accomplishment of ends at variance with the best interests of those over whom it assumes the right to exercise control. It derives its strength largely from the membership of those who, like car drivers, laborers, railroad employees, &c., are not eligible to membership in trade unions. If it were true that all who work for wages, with or without special skill and training, have interests in common which can be promoted by a comprehensive organization of this character, there would be a reason for its existence; but since whatever unskilled labor gains by organization is obtained at the expense of skilled labor, the heroic spirit which prompts such sacrifices cannot last very long, and selfishness is bound sooner or later to assert itself. The trade

unions which allow themselves to be merged into the Knights of Labor make a sacrifice without gaining any compensating advantage, and now that a majority of these organizations have adopted a defensive policy the issue of the battle in progress must, we think, be to break the order which, without the active co-operation of skilled labor, cannot hold together.

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AMONG THE fine buildings that are annually put up in New York curious combinations of materials are frequently witnessed. Those who indulge in fine residences frequently desire something used in their construction which has peculiar associations about it. In other cases choice is influenced by relative cost. An example in point is a building located near Fiftieth street and Ninth avenue, which attracts the attention of observers on account of the fine stone that is used in the window caps. The stone has a finished appearance like that which is frequently seen in monuments, and in this respect differs materially from the common cheap stone used for the same purpose in other buildings in the neighborhood. On inquiry it is learned that the limestone in question was imported from Ireland, and it seems that that there was a curious bit of history connected with this importation. It is told, by one who is familiar with the circumstances, in the following terms: "The stone comes from the quarries of Ballinasloe, at Connaught, County Roscommon. The builder who imported it is Peter Rafferty, which you will recognize as a good old Irish name. Years ago he was a day laborer in the quarries at Ballinasloe. He came to this country and gradually worked his way up until he has a little stone business of his own. About a year ago he was talking with Mr. Striker, a wealthy man for whom he was doing business, when he suggested the use of this Irish stone, which has been used for centuries for monuments, and is much cheaper than the coarse and brittle limestone generally used here. Mr. Striker furnished him the money with which to make the experiment of getting a cargo of the stone. He went over at once and found the laborers in the quarry working for about 36 cents a day in an indifferent sort of way. He made contracts for the stone, conditioned on the men getting 2/6 a day, which was a raise of 1/ on their wages. In 29 days from the time he left here he was back with 50 tons of the stone and was cutting it to put into this building. It is quite likely that large quantities of it will eventually be imported." One difficulty in the above is the remarkably short time consumed in the voyage and the shipment of the material. This is manifestly in error.

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ONE OF OUR exchanges published in the South, in discussing "Old-Fashioned Shingles," presents statements that will no doubt prove of interest to our readers: "In the early days of Middle Tennessee, and indeed up to the war, and in some sections until the present time, a shingle for covering a house was always understood and agreed to be a shingle made of red cedar, 18 inches in length, rived with the grain of the wood, drawn perfectly flat or slightly hollowing with a drawing-knife ¾ inch thick at the butt end and to a feather at the other. If any other wood was used it was specified in the contract and always furnished at a less price than cedar shingles. Cedar was very plentiful in those days, and its lasting qualities were well known. The writer of this article has personal knowledge of a farmhouse roof made of drawn cedar shingles that was put up in 1834. It has never leaked a particle up to the present time, but a green moss has accumulated on it, so that it is impossible to distinguish the kind of wood the shingles are made of. In the town of Statesville, Tenn., there were standing until within the past four or five years several houses built more than 60 years ago that never had but one roof on them, and that was made of hand-drawn shingles. These houses were torn down to make room for new improvements. It was found that the green moss before mentioned had accumulated to such a thickness as to make an impervious roof where the sheathing was laid close. But in those days there was no sawed sheathing; it was rived from straight-grained white oak, about 4 inches wide, ½ inch thick. These were nailed on to the rafters to suit each course of shingles as they were laid, and must have been not less than 6 inches apart from center, because the rule for laying 18-inch shingles was that only 6 inches must be 'shown to the weather.' If the roof had been closely sheathed there is no telling how long the moss-covered roof would have kept out the sunshine and the rain. This moss is the great enemy of the drawn (shaved) shingle, and it accumulates much more rapidly upon sawed than hand-shaved (or drawn) cedar shingles."

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## THE PLATES.

In Plate XXXIII we present a study in interior finish by H. P. Miller, architect, of Philadelphia. Details of this design will be found on the page of text following the plates.

In Plates XXXIV, XXXV and XXXVI are presented portions of a study in house designing by Christian G. Vierheilig, architect, Grand Rapids, Mich., submitted in the Seventeenth Competition. Reference is made to this study in another part of this issue.

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### Seventeenth Competition.

(Continued from page 146, August issue.)

"Luck" (No. 15) is another designer who uses various sizes of paper for his studies. Three elevations are on a long strip. The floor plan and roof plan are on a piece of paper wider than the one just referred to and about two-thirds the length, while the first-floor plan is on another size of paper. The paper up to this point is white drawing paper. The details are grouped on still another size of manila drawing paper. The details are very meager, and show parts in which carpenters would feel but small interest. The elevations are very plain, and are spoiled for purposes of reproduction by being brush shaded.

"Boston" (No. 79) presents a somewhat ambitious effort, representing a house with a round corner, terminating in a beehive shaped tower. The perspective, so far as the house is concerned, is worked out much better than the trees and yard. The designer fails, however, to get the same general view of the curtains and other parts back from the front that he does of the house, so that his design is open to criticism. His perspective, in draftmanship, is a better piece of work than are either of his elevations.

"Reg." (No. 7) submits drawings of such a house as is very commonly erected in towns of moderate size on ordinary lots. There is no variation in the architectural features from the rank and file of houses that are built without the superintendence of an architect. The interior, however, has been arranged with more care than is ordinarily employed. Various sizes of tracing cloth are used in the different views.

The study submitted by "Argonaut" (No. 61) ranks far above many of its fellows. The draftsmanship is excellent and the details have been judiciously selected and are well executed, showing work in such a way as to make them of real assistance to the builder. The elevations, in their character, are the least satisfactory of the work shown. The rooms shown on the first floor are unusually large, while those in the second story average much smaller. The plans have been carefully considered and contain many excellent features.

"C. A. Ferguson" (No. 4) should take a course in architectural drawing under a competent master before venturing to write "Architect" after his name. Some attention to the principles of design and also to principles of construction will not be amiss, although the study which he submits is better in mechanical features than otherwise. The scarcity of details presented illustrates this competitor's limitations. As a schoolboy's effort the study should perhaps be considered creditable, but it is hardly up to the standard of what an architect, as this designer signs himself, should be able to produce.

"Student" (No. 11), by the very *nom de plume* he has chosen, shows what he considers himself to be. His work is creditable, and yet there is evidence of inexperience, both in construction and draftsmanship, shown in every part of it. Should the author of this study have an opportunity to work under a competent instructor he will no doubt be able to develop the talent which he evidently possesses in a way to make it advantageous in a business way.

"Suburban" (No. 19) submits a study that is unbalanced in many particulars. Some features of the draftsmanship displayed in the elevations would make us expect better things than are shown in other parts. The design is so commonplace that it suggests being copied from some of the conventional houses shown in the popular family magazines 25 years since. Yet it evidently has been labored with.

"Nanon" (No. 41) submits a study on paper the sheets of which are of uniform size, and the corners of which have been carefully rounded to avoid dog-earring. On this account the study makes a more favorable presentation than many others with which it might be compared. It is evidently the work of a beginner, and, while creditable as a student's effort, it would not be acceptable to the practical readers of this journal. The author will improve by the advice given some of the other amateurs above named.

"Franklin" (No. 17) has evidently had limited experience in planning and designing buildings. He requires practice in draftsmanship and better knowledge of building construction before he will be able to compete with the average architectural talent of the country.

"Blot" (No. 53) submits a study the draftsmanship of which is striking, and which in various respects possesses merit. It has one or two eccentricities about it, however, possibly showing the author's bias, and which under certain circumstances might please certain clients. Should it please any one, however, we venture to say it would be those of eccentric tastes rather than average house builders. The balcony with a solid railing, so far as can be judged by the elevations, for there is no detail of this part shown, is projected from the second story. It has no visible support, but resembles the ledges that are sometimes placed about bird cages and martin boxes. This balcony measures 32 feet in length, 6 feet in width a portion of its distance, and 17 feet in width across the front, which is almost semicircular in plan. There is no covering above the balcony. What its purpose can be except to catch an unreasonable quantity of snow in winter, and be a place to be avoided on a hot summer day, we cannot conceive. In other respects the floor plans have been carefully considered and possess many distinctive merits. The details submitted are meager.

"C. R. G." (No. 40) presents a study which in the hand of a competent builder would result in a house of more than average quality. Various sizes and pieces of tracing cloth have been used for containing the several views, but they have been combined in such a way as to form a portfolio. The details are numerous and are accompanied by written explanations showing their positions.

The design submitted by "West," (No. 50)

represents the average house with broad projecting cornices and a roof inclined to be flat. It is marred by a cresting which is several times too high and too large in the members for the place. The details are numerous, but show a lack of familiarity with construction in some parts. In other respects they are good. The floor plans are probably the least meritorious of all.

"Moonlight" (No. 23), like some others whose efforts we have criticised, has spoiled a fair effort at perspective, so far as the house is concerned, by an attempt to introduce trees and figures. A barn, supposed to stand considerably to the rear of the house, has been carelessly drawn, and also serves to detract from that which in some respects is good draftsmanship in the building. The elevations submitted in this study are carefully drawn, and the floor plans also show evidences of good draftsmanship. The details are better in their general quality than many of the designs submitted.

"Philip Dean" (No. 14) arranged the designs containing his study in the form of a portfolio with manila paper covers. The house shown is of average merit, architecturally speaking, and the draftsmanship, while not of a high order, is better than that of many other studies which we have considered. There is a fussiness about the floor plans, owing to careless lettering and figuring. The floor plans are colored, which, as we have before remarked, would spoil them for direct process in reproduction. The careless lettering would also be an objection. The draftsmanship of the details is scarcely equal to that of some of the other parts. The original drawings may be much better than the tracings, for some of the blemishes in the work seem to be due to careless tracing rather than the fault of the original design.

"Land o' Cakes" (No. 24) arranged his study on four sheets of bristol board, and on two sheets of white paper of the same size wrote his specification and description. The whole was inclosed in a folding cover of manila paper. The presentation made is a fair one and is deserving of praise. The perspective is the least satisfactory of the several studies submitted. It does not do the designer credit, and is spoiled by a large amount of cross-hatching. The details are next to nothing in quantity and character, and show a lack of familiarity with building construction upon the part of the competitor.

"Dixon" (No 27) likes a multitude of small pieces of paper, and it does not seem to bother him a particle if no two of them are of the same size. His letter of explanation is on one size of paper, while his specification is on paper twice as long and somewhat wider. Among the details prominent attention is given to a sideboard for the dining-room, and the construction shown is unique, to say the least.

"Crescent" (No. 8) presents a design that is creditable in many particulars, and is such a building as might be required in a special location, as, for example, the seaside. It is not adapted to the wants of the average house builder. The design has unfortunately a low and squatty appearance, owing to the considerable length in proportion to the hight of the stories. The floor plans are elaborate, and seem to be well considered. The perspective is among the best that were submitted in this competition, and is much superior in draftsmanship to the several elevations.

"Rural" (No. 12) will have to come to town and take a course in architeture before he will be in a position to direct the practical efforts of builders.

"Evening Star" (No. 21) sent us a "chromo" for the perspective view. While in some particulars we think it better than the colored plates put forth by some of our contemporaries, still the committee was obliged to pass it by because it was not adapted for publication in the general way mentioned in the specification of this contest. Referring again to the painting which this competitor has tried to indicate, we are safe in saying that Solomon in all his glory never had a house painted like unto this one. The draftsmanship of the elevations and floor plans is better than the average, and the details submitted are on sheets of paper among the largest of those received in this contest.

"N. G. L." (No. 10) shows a lamentable lack of technical skill, both in draftsmanship and in features of construction. From what he has submitted we very much fear he has mistaken his calling.

"Target" (No 65) manifests a skill in draftsmanship that is worthy of better training than it has received to date. His study, while showing immature thought in some respects, contains meritorious features. One criticism that might be made upon the elevations is the fineness of work and a painstaking in small matters. The elevations as they are, with a few bold lines added to highten the effect, would rank far better than is possible without this improvement.

"Triangular Scale" (No. 9) submitted a study that in many respects would be satisfactory to the Editor to publish. Shading on the elevations is obtained by brush tints, the objection to which we have already explained. The floor plans are also colored.

"Oliver Twist" (No. 49) sends a study with colored floor plans, the draftsmanship of the elevations being of a fair order of merit. The details in quality are above the majority of those submitted in this competition.

(To be continued.)

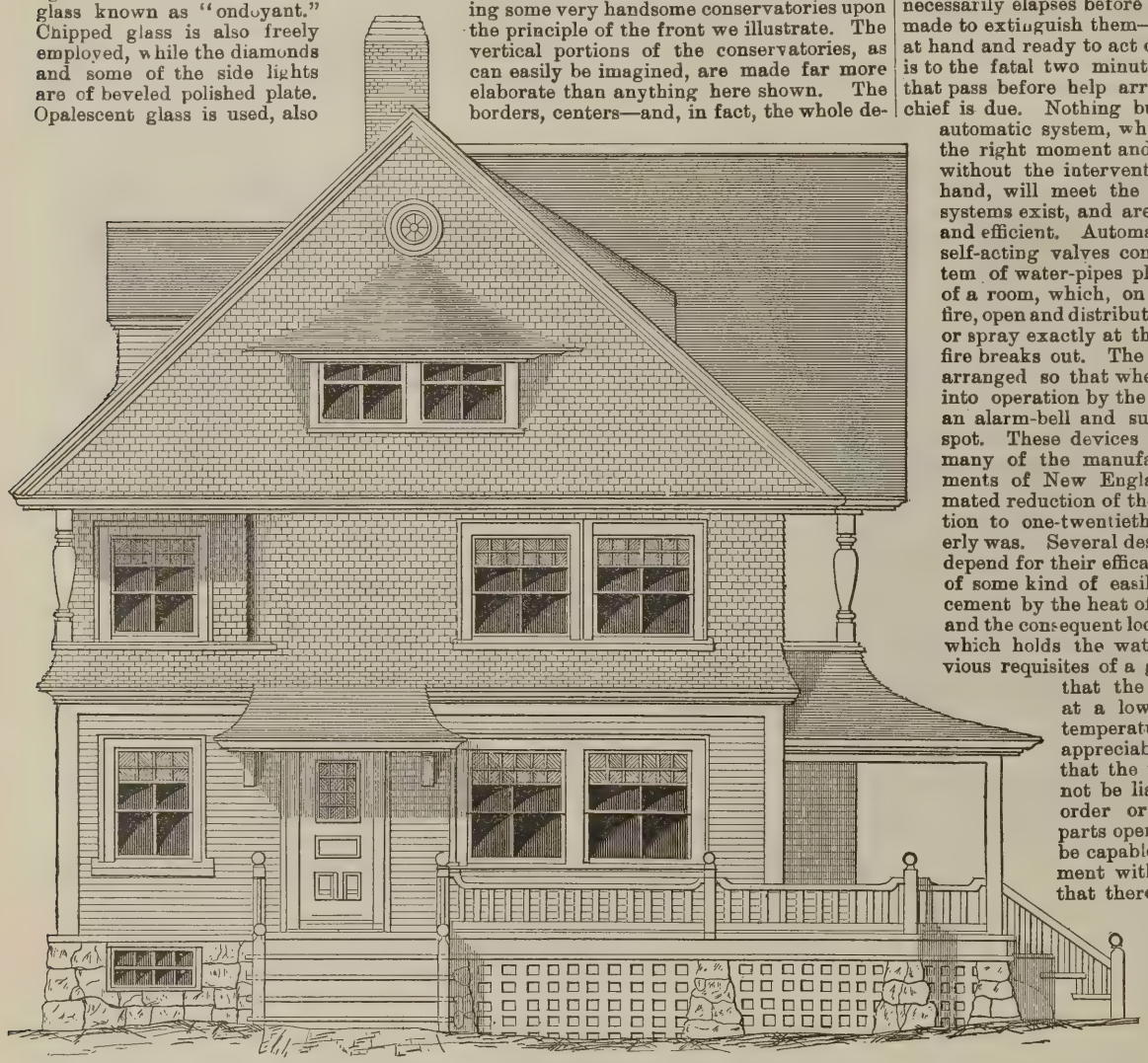
## New Ideas in Glazing.

The accompanying engraving represents the new shop front which George Hayes, of No. 71 Eighth avenue, this city, has recently put into his well-known establishment. The new front is very striking—so unique, indeed, that it very generally commands the attention of the casual passers-by. Many of its features, however, are lost in the engraving, and we fail to convey to our readers by the illustration alone an idea of the real attractiveness of the front. The building was formerly a residence, with storeroom on first floor. This Mr. Hayes many years since converted into a workshop. More recently he has remodeled the entire building, putting shops on all the floors and making the portion in the cut his general business office, while his own private office is on the second floor, the entrance to which is by the small door to the right. In remodeling the establishment heavy machinery has been put into the basement. This has been excavated to a greater extent than was the original intention of the builders, and has been lighted in a way that is eminently characteristic, and successfully illustrates applications of some of the specialties which Mr. Hayes manufactures. The vestibule of the entrance to the shop, shown at the left, is floored with vault lights set in concrete of

*New Ideas in Glazing.—Shop Front of the Hayes Skylight Works, New York.*

the Tice & Jacobs pattern. The sidewalk lights are of the same general character. In addition to this the base of the office front is filled in with sash, as shown, and a projection in the office equivalent to a small counter affords space for swinging the sash for ventilation, and also the passage of light. By this arrangement the basement is made unusually light, and is well adapted for the special machinery placed therein. The sash already referred to, as well as the sash of the upper portion of the large window, are made entirely of sheet metal. The same may be said of the finish about the small door at the right and also of the transom in the large door at the left. In the glazing of these portions as much skill and taste have been displayed as in any other part of the work. Various kinds of glass are employed, and ingenious construction is displayed in many particulars. The larger lights are of a kind of glass known as "ondoyant." Chipped glass is also freely employed, while the diamonds and some of the side lights are of beveled polished plate. Opalescent glass is used, also antique, while jewels are freely interspersed to add character to the work. We have entered many offices the street fronts of which were formed of glass, as in this case, but never have we seen so pleasant a light and one so agreeable to the eyes as is encountered in this establishment. The glazing that Mr. Hayes has introduced in this case is likely to become popular for offices as well as in many other directions. Its possible applications are extremely numerous. The ventilation of the office has in no wise been neglected. The small horizontal panels just above the basement sash are made to swing inwardly, affording an entrance for outside air at that point. In the same manner corresponding panels at the top of the glazing also open. The diamond panels in the center of the glazing are arranged with a slide, box fashion, and may be pushed outward, in which case there is an opportunity for the air to enter through the perforated sides. Hoods are so arranged as to prevent rain driving in. Considerable originality has been displayed also in the management of the cornice over the front. The signboard on which the legend of the establishment is displayed is the face of the rolled beam which carries the brick wall, placed upon it. Cast-iron pieces are introduced at the ends in a way to complete the panel shape, and the nuts on the ends of the bolts, which extend inward to other ironwork, are concealed and at the same time made somewhat ornamental by means of acorn-like bosses. The cap above this part is of galvanized iron, but is composed altogether of bends, no curves or molded forms being introduced. Throughout the work is unique and displays many evidences of the originality of the constructor. Much of the effect, as indicated at the outset, fails to be apparent in the engraving, because it is obtained by colors, which, of course, we are unable to reproduce.

Mr. Hayes is at present engaged in building some very handsome conservatories upon the principle of the front we illustrate. The vertical portions of the conservatories, as can easily be imagined, are made far more elaborate than anything here shown. The borders, centers—and, in fact, the whole design—embody more work. With judicious combinations of different kinds of ornamental glass now in the market very beautiful effects are obtained. We understand that it is Mr. Hayes's purpose to extend this principle of construction to church and tracery windows. He asserts that the old-fashioned stone and wood mullions, as well as the heavy and dull tracery now used in such work, can be dispensed with. Where from 3 to 6 inches have been taken up by the stone or wood work in the past, he proposes to consume only ¾ inch to 1¼ inches, and at the same time combine beauty of design with strength and insure the admission of more light. The same principle is to be extended to store fronts. The most beautiful effect may be obtained by substituting polished plate glass where in this case the ondoyant glass is used. The difference in cost between small and large plates of glass will pay for the elaboration in design. It is evident that there is much of interest in this to architects and builders in general.



*House Design by George Mathews, Architect, Boston, Mass.—Side Elevation.—Scale, ⅛ Inch to the Foot.*

## A Unique House Plan.

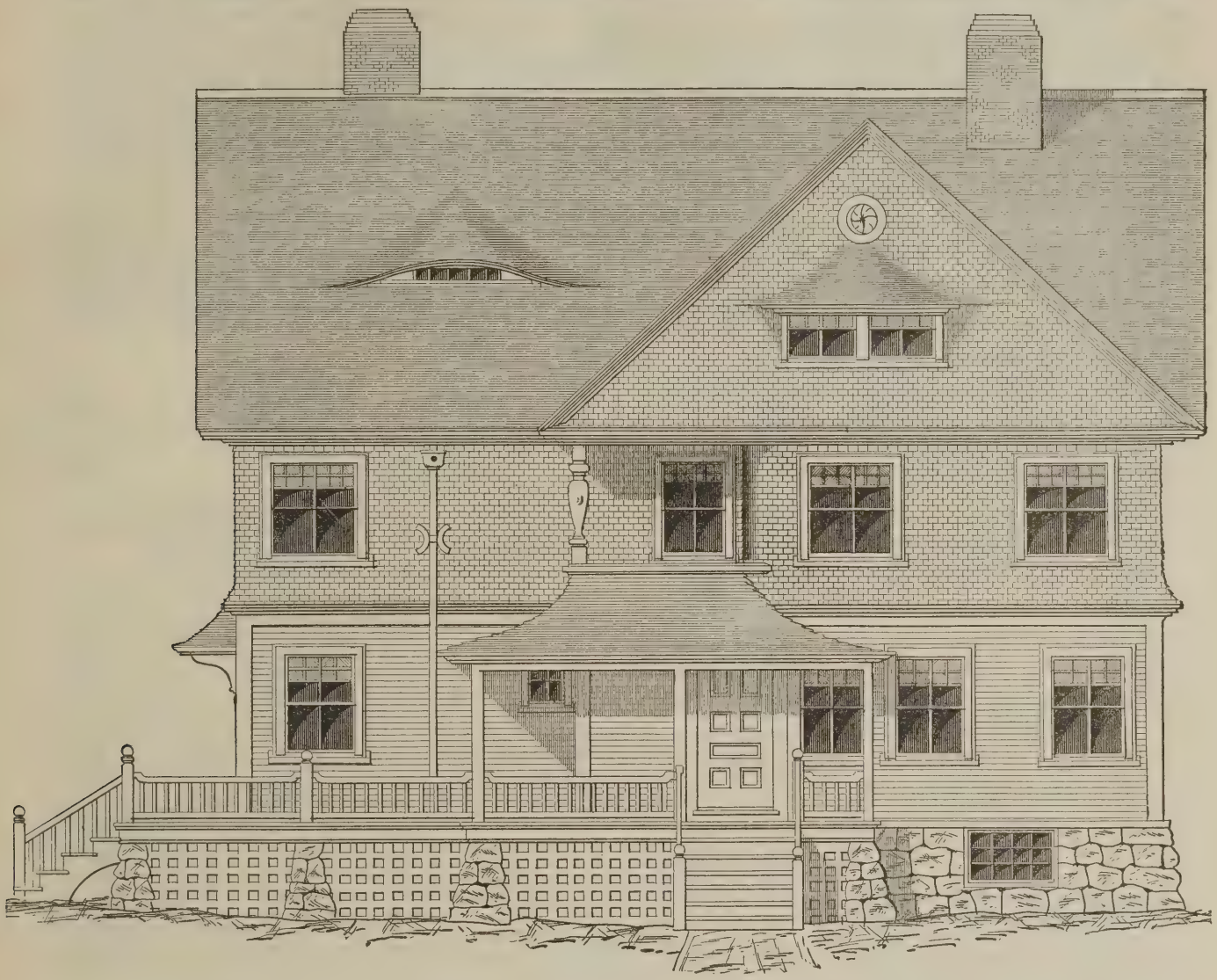
The accompanying floor plans and elevations are from George Mathews, 38 Worcester square, Boston, Mass., and are a portion of a study submitted in the Seventeenth Competition. We lay them before our readers on account of some novelties in arrangement, particularly the first-floor plan and the management of the stairway. The features are sufficiently obvious to require no lengthy description.

## Automatic Fire Extinguishers.

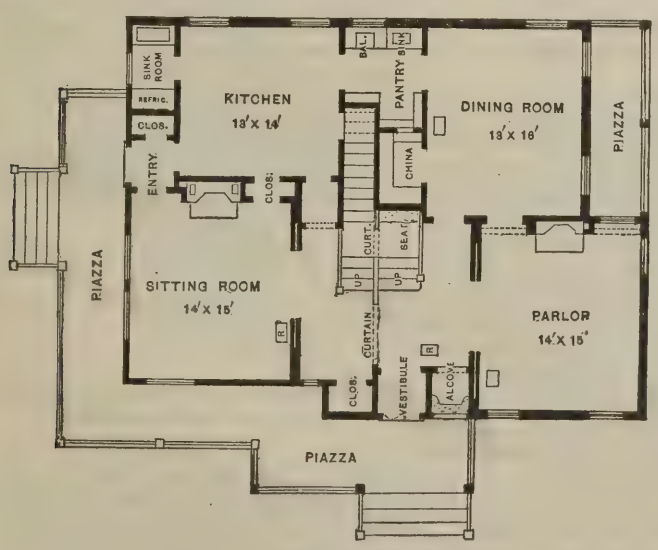
Prof. Silvanus P. Thompson, in a recent address before the Society of Arts, says the *Popular Science Monthly*, dwelt upon the fact that great fires usually owe their magnitude and their consequent terrors to the circumstance that a certain interval of time necessarily elapses before any application is made to extinguish them—because no one is at hand and ready to act on the instant. It is to the fatal two minutes or five minutes that pass before help arrives that the mischief is due. Nothing but a self-acting or automatic system, which will operate at the right moment and at the very spot, without the intervention of the human hand, will meet the case. Automatic systems exist, and are of several kinds, and efficient. Automatic sprinklers are self-acting valves connected with a system of water-pipes placed in the ceiling of a room, which, on the outbreak of a fire, open and distribute water in a shower or spray exactly at the place where the fire breaks out. The apparatus may be arranged so that whenever it is called into operation by the heat it shall sound an alarm-bell and summon aid to the spot. These devices are relied upon in many of the manufacturing establishments of New England, with an estimated reduction of the risk of conflagration to one-twentieth of what it formerly was. Several designs for sprinklers depend for their efficacy on the melting of some kind of easily-fusible solder or cement by the heat of the incipient fire, and the consequent loosening of the valve which holds the water back. The obvious requisites of a good sprinkler are that the solder should fuse at a low and well-defined temperature, without any appreciable prior softening; that the mechanism should not be liable to get out of order or stick; that the parts opened by heat should be capable of ready replacement without skilled labor; that there should be no leakage at the valve, and that the quantity of solder to be melted should be small, and so placed that it is not cooled by contact with too great a mass of metal, or exposed to the drip of the opening valve. Closely allied to the automatic sprinkler proper is the system of sprinkling by perforated pipes through an automatic valve. The automatic fire-door, which should not be of iron, because it curls up, but of wood protected by sheathings of tin plate, is arranged to shut on an inclined track, and is kept open by a rod made with a scarf joint in two parts twisted in the center, and secured by a fusible solder; or the door may be held by a cord holding a weight, the fall of which releases the door; the fall to be produced by the melting of a solder set in some convenient part of the cord. Another class of devices depends upon the introduction into the electric circuit of a fusible link, the melting of which breaks the circuit; or into the broken circuit of a strained catgut band, the contraction of which by the heat brings the wires into contact. In one of the applications of this system a reservoir of carbonic acid is opened and the acid distributed. Mr. Jolin has invented an arrangement for mak-

ing the hand-grenade extinguisher automatic. He proposes to hang the grenade at the top of a room in a sort of a cage, which is provided with a small button held together with fusible alloy. When that is affected by the ascending hot air, the button bursts, and the cage opens and allows the grenade to fall, while an iron weight follows it, and, breaking it in mid-air, causes the liquid to be sprinkled about.

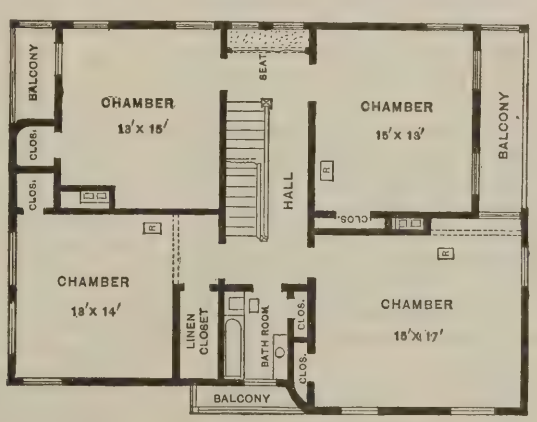
The Postmaster-General has decided to extend the immediate delivery system to all the post offices in the United States on October 1 next, in accordance with the direction given him by the act of August 4, 1886. This act also permits merchandise of all kinds mailable under the regulations of the department, as well as letters, to be entitled to immediate delivery when bearing the proper 10-cent stamp in addition to the stamps necessary to fully prepay the postage. With certain exceptions every kind of merchandise when properly packaged and not exceeding 4 pounds in each package is admitted to the mails, and will be entitled to immediate delivery if within the delivery limits of any letter-carrier office, or within 1 mile of any other post office in the United States. It is expected that after the new regulations have gone into effect a large amount of merchandise will be sent by mail which has heretofore been sent by express, the postage being 1 cent per ounce, or 16 cents per pound, with 10 cents additional for immediate delivery.



*House Design by George Mathews, Architect, Boston, Mass.—Front Elevation—Scale, ⅛ Inch to the Foot.*




First Floor.




Second Floor.

*Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.*

Southern sawmills are occasionally cutting into a grape-shot embedded in trees during the late war, and a firm who make saws publish as an advertisement the statement of a sawmill owner that the finely-tempered saw he bought of the said firm had sawed clean through one of the shot 1¼ inches in diameter without hurting the saw.

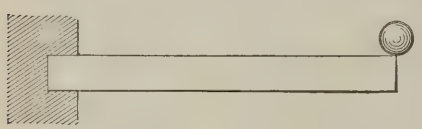
## A Plain Talk on the Strength of Beams.

BY ARTUS

Few carpenters or mechanics understand how to calculate the strength of beams, or know anything of the strains and stresses to which they are subjected under the various conditions of loading. The reason is in a great measure that the many works which treat of the subject deal with it in such a way, and make algebra and the higher branches of mathematics so necessary a portion of the working of the problems, that it is not within the range of a mechanic of ordinary "school learning." A short description of the manner in which the strength may be obtained in a simple manner will, therefore, probably prove of use and interest to our readers.

It will be understood in the first place that the strength of a beam, of whatever material it may be, depends upon certain laws and conditions. For the purpose of ascertaining what those laws are we will make a few experiments. We take four pieces of Georgia pine of average quality free from defects, and we call them Nos. 1, 2, 3 and 4 respectively. No. 1 is 6 inches x 6 inches x 6 feet; No 2 is 6 inches x 3 inches x 6 feet; No. 3 is 3 inches x 6 inches x 6 feet, and No. 4 is 6 inches x 6 inches x 3 feet.

Now, we build all these beams in a wall in such a manner that they act as cantilevers,



*Strength of Beams.—Fig. 1.—Beam Firmly Supported at One End, with Load at Opposite End.*

as shown in Fig. 1, and we place weights upon the free ends, and continue to weight them until they break. We find that the weights required to break them are as follows: No. 1, 7632 lbs.; No. 2, 3816 lbs.; No. 3, 1908 lbs.; and No. 4, 15,264 lbs.

We now take beam No. 1 as a standard, and by comparing the figures we are able to deduce our rules. No. 2 is one-half as broad as No. 1, and the breaking weight is exactly half as much, from which we obtain our first rule, viz., that the strength of a beam varies directly with the breadth—that is, if we double the width of the beam we double the strength, and so on.

Beam No. 3 breaks with a weight of one-fourth that of No. 1, establishing the second rule, viz., that the strength of a beam varies as the square of the depth.

Beam No. 4 breaks with a weight of exactly twice as much as No. 1, whence the rule that the strength of a beam is inversely as its length—for example, if we double the length we halve the strength, and if we halve the length we double the strength.

Having deduced these facts, we next ascertain by trial that the breaking weight of a piece of Georgia pine 1 foot long, 1 x 1 inch, when built in a wall and loaded at the end, is 212 pounds. This is for a specimen of average quality, and at once gives us a unit to work upon. We wish to obtain the breaking weight of any other solid piece of timber similarly supported and loaded, and,

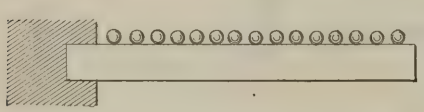


*Fig. 2.—Beam Firmly Supported at One End, with Load Evenly Distributed.*

applying the rules deduced from our experiments, we multiply 212 by the breadth of the beam in inches, this by the square of the depth in inches, and divide by the length in feet. For example, take a beam 6 x 6 inches x 6 feet; here we have $\frac{212 \times 6 \times 36}{6} =$ 7632 pounds.

Now, it is clear that we shall want to ascertain the strength of materials other than Georgia pine. Below is a table giving the unit—that is, the breaking weight of a piece measuring 1 x 1 inch x 1 foot—of the principal materials in common use. The figures are those of three of the best authorities on the subject:

*Fig. 3.—Beam Resting at Each End, with Load in Middle.*

| | Hatfield. | Molesworth. | Trautwine. |
|---|---|---|---|
| Acacia | ... | 117 | ... |
| Georgia pine | 212 | ... | 212 |
| Locust | 300 | ... | 175 |
| Beech | 119 to 125 | ... | 117 |
| Spruce | 137 | 93 | 112 |
| White pine | 125 | 77 | 112 |
| Hemlock | 112 | ... | 125 |
| White wood | 150 | 105 | ... |
| Elm (Canadian) | ... | 120 | ... |
| Chestnut | 120 | 110 | 112 |
| Lignumvitæ | ... | 215 | 162 |
| Maple | 275 | ... | 187 |
| Hickory | 262 | ... | 200 |
| Ebony | ... | 131 | ... |
| Cherry | 162 | ... | ... |
| Teak | ... | 131 | 187 |
| Black walnut | 187 | ... | 137 |
| Mahogany | 162 | 119 | 187 |
| Cast iron (American) | 625 | ... | 575 |
| Cast iron (English) | 700 | 364 | ... |
| Wrought iron (American) | 650 | ... | 562 |
| Wrought iron (English) | 475 | 532 | ... |
| Bar steel | 1,500 | ... | 1,250 |
| Bluestone flagging | 50 | ... | ... |
| Sandstone | 15 | ... | 11 |
| Brick, common | 8 | ... | 7 |
| Brick, pressed | 9 | ... | 10 |
| Marble | 34 | ... | 35 |

It will be noticed that the figures given by the English author Molesworth are in many cases considerably lower than those given by the American authorities. This is accounted for by the fact that in England it is the custom to allow about one-third in the breaking weight for knots, shakes, and other defects in the timber, and to calculate a lower proportion between the breaking weight and the safe load, as will be presently explained.

We are now able to find the strength or rather the breaking weight of a piece of any

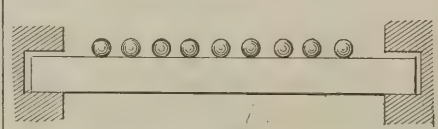


*Fig. 4.—Beam Resting at Each End, with Load Evenly Distributed.*

of the materials given in the list, but only when the piece is fixed as a cantilever, viz.: built in a wall at one end and loaded at the other, as Fig. 1, but we may have the beam supported or loaded in either of the various ways, as follows: Built in a wall and weight distributed, as in Fig. 2. Supported at both ends and weighted in the middle, as in Fig. 3. Supported at both ends and weight distributed, as in Fig. 4. Fixed at both ends (as by being built in a wall) and weighted in the center, as in Fig. 5, and fixed at both ends, as in the last example, and the weight distributed, as in Fig. 6. If the beam breaks with a load of, say, 1 ton in the first case, as shown in Fig. 1, then it will break with a weight of 2 tons in the second, 4 tons in the third, 8 tons in the fourth, 6 tons in the fifth, and 12 tons in the sixth.

Carefully examining these figures we find, first, that beams will carry twice as much if the weight be distributed as they will if it is placed on the center; secondly, that a beam will support four times as much in either case if supported at both ends as it will if only fixed at one end, and, thirdly, that a beam bears half as much again when its ends are fixed in a wall as it does when they are simply supported.

Our experiments above mentioned were performed, it will be remembered, upon a piece of timber built in a wall and loaded at the free end, as in Fig. 1. If, therefore, we wish to find the strength of either of the other beams it will be only necessary to proceed as in the previous case and then to multiply by a figure according to the manner in which the beam is loaded and supported. For example, suppose we wish to ascertain the strength of a beam of Georgia pine 10 feet by 5 inches by 6 inches which is supported at both ends and weighted in the middle. We multiply the unit for Georgia pine, 212, by 4 for the difference between the cases, then by 5 for the breadth, and then by 36, the square of the depth, dividing by 10 for the length: $\frac{212 \times 4 \times 5 \times 36}{10} =$ 15,264 pounds, which is the breaking weight of the beam under the conditions noted. It must be understood that in comparing these beams the unsupported span is considered to be the length, as shown in the sketch. We have now found the breaking weights for all beams in the positions in

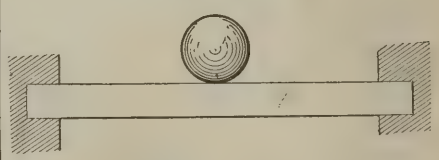


*Fig. 5.—Beam Firmly Fastened at Each End, with Load in the Middle.*

which they are most ordinarily employed. The safe load to which it is advisable to weight them will depend in a great measure upon the description of load. If a dead weight, then one-sixth of the breaking weight for timber and iron of good and reliable quality is a safe and usual limit. For a "live" load—that is, one which is in motion, as in the case of the guide supporting a railway bridge—one-twelfth the breaking weight is a good limit. In Great Britain the custom is to take these limits, or even less, and in using the units of Molesworth they will give a fair result. If, however, the units of Hatfield or Trautwine are employed it will be safer to take one-tenth of the breaking weight as a safe live load.

Such materials as stone and brick, &c., although given in the table, are rarely, if ever, used as beams, as they are given simply in order to show the relative strengths.

## Cooling and Ventilating Cellars.

One of our exchanges presents the following directions for cooling cellars that is of interest to all house owners: "A great mistake is sometimes made in ventilating cellars and milkhouses. The object of ventilation is to keep the cellars cool and dry, but this object often fails of being accomplished by a common mistake, and instead the cellar is made both warm and damp. A cool place should never be ventilated, unless the air admitted is cooler than the air within, or is at least as cool as that, or a very little

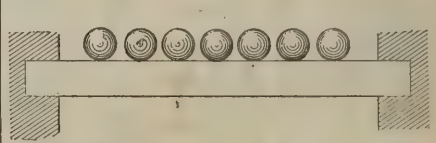


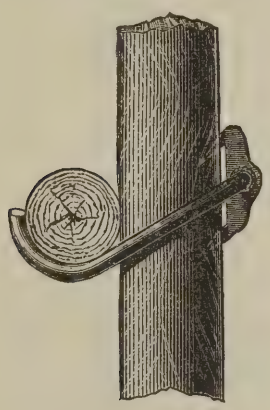
*Fig. 6.—Beam Firmly Fastened at Each End, with Load Evenly Distributed.*

warmer. The warmer the air the more moisture it holds in suspension. Necessarily, the cooler the air the more this moisture is condensed and precipitated. When a cool cellar is aired on a warm day, the entering air being in motion appears cool, but as it fills the cellar the cooler air with which it becomes mixed chills it, the moisture is condensed, and dew is deposited on the cold walls, and may often be seen running down them in streams. Then the cellar is damp and soon becomes moldy. To avoid this the windows should only be open at night, and

late—the last thing before retiring. There is no need to fear that the night air is unhealthful—it is as pure as the air at midday, and is really drier. The cool air enters the apartment during the night and circulates through it. The windows should be closed before sunrise in the morning, and kept closed and shaded through the day. If the air of the cellar is damp it may be thoroughly dried by placing in it a peck of fresh lime in an open box. A peck of lime will absorb about 7 pounds, or more than 3 quarts of water, and in this way a cellar or milkroom may soon be dried, even in the hottest weather."

## A New Scaffold Clamp.

We published in these columns a short time since an illustrated description of a device for fastening together the supports and horizontal timbers for scaffolding. The



*New Scaffold Clamp.—Fig. 1.—End View, Showing Clamp Sustaining the Ledger.*

design illustrated European practice. The engravings which we present herewith show another and perhaps simpler device for the same purpose, which is also European in its origin. It is manufactured by a Prussian firm of engineers. It is designed to take the place of lashing of scaffold poles and to secure the scaffold in a way to make the danger to workmen less than when the old style of fastening is employed. The inclined hook which holds the cross-bar is made of steel, and the dog-clamp of wrought

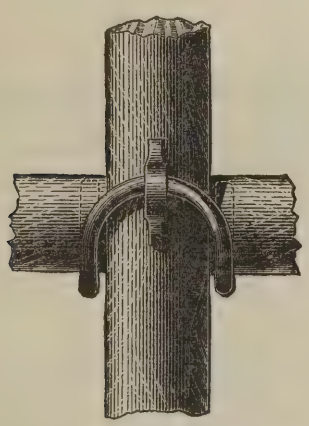
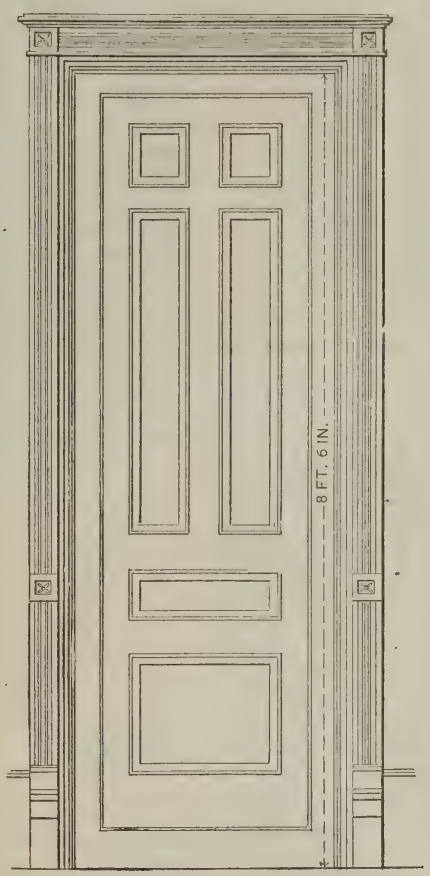


*Fig. 2.—Back View of Clamp.*

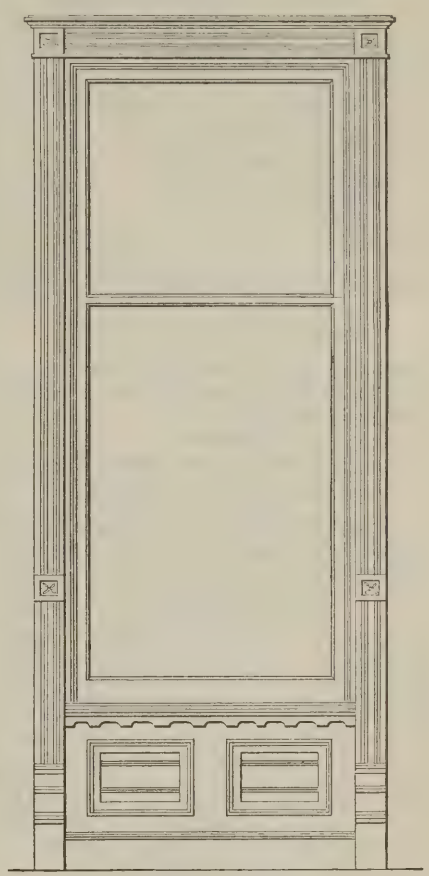
iron. The arrangement of the parts is such that the dog-clamp is forced more and more into the pole as the weight upon the scaffold is increased. Additional advantages claimed for this device are that there is an important saving of time in erecting and taking down scaffolding, and great durability. It is evident that no injurious effects can be wrought by changes of weather. We do not know that this article or its equivalent is manufactured in this country, and therefore we produce it as a suggestion that may be acted upon by enterprising manufacturers.

## House Design.

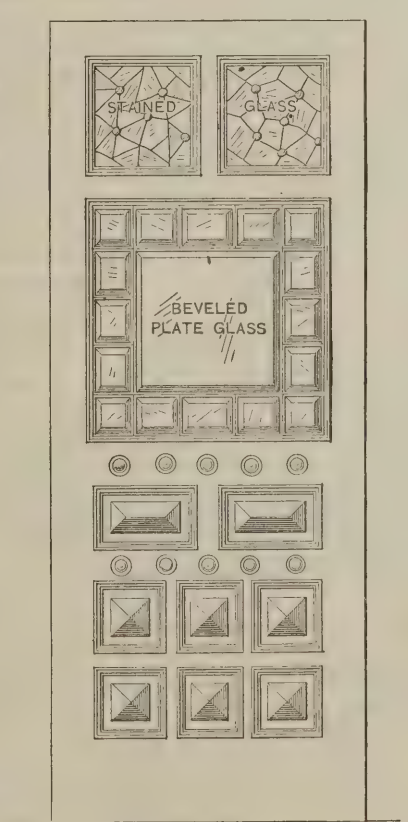
The dwelling of which we present the perspective view, elevations, floor plans and details by means of the engravings on this and succeeding pages and our lithographic plates was designed by Christian G. Vierheilig, of Grand Rapids, Mich. The drawings are self-explanatory and need very little description. In his specification the author of this design provides for plumbing and piping for gas throughout. The inside finish is specified of a better quality than is ordinarily employed in houses of its class. The finish of the hall and staircase, also of the dining-room, is specified of red oak; that of the sitting-room, parlor and library of butternut. The finish of the other rooms,



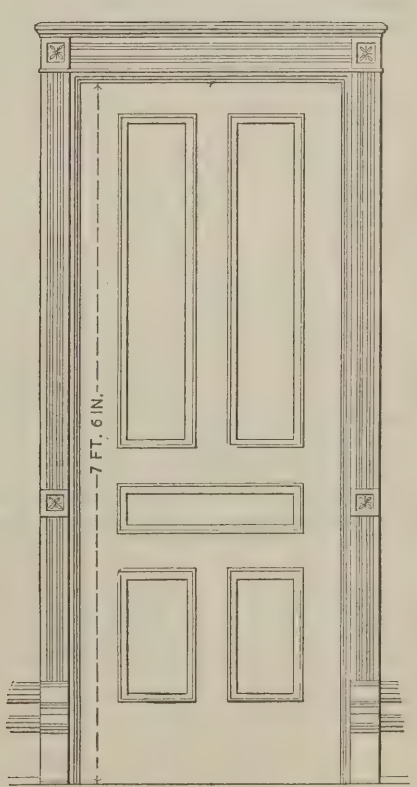

Sliding Door.



Window Finish.



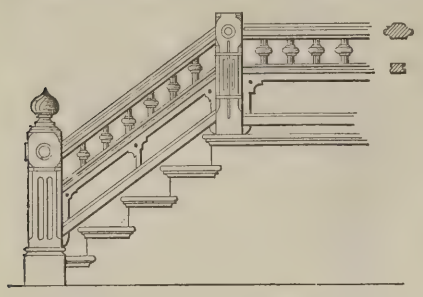

Front Door.




Swinging Door.

*Doors and Windows of House Illustrated in Plates.—Scale, ½ Inch to the Foot.*

including the second story, is to be of pine. The windows in the rooms finished in hard-wood have the frames carried to the floor, and are provided with paneled brests. The

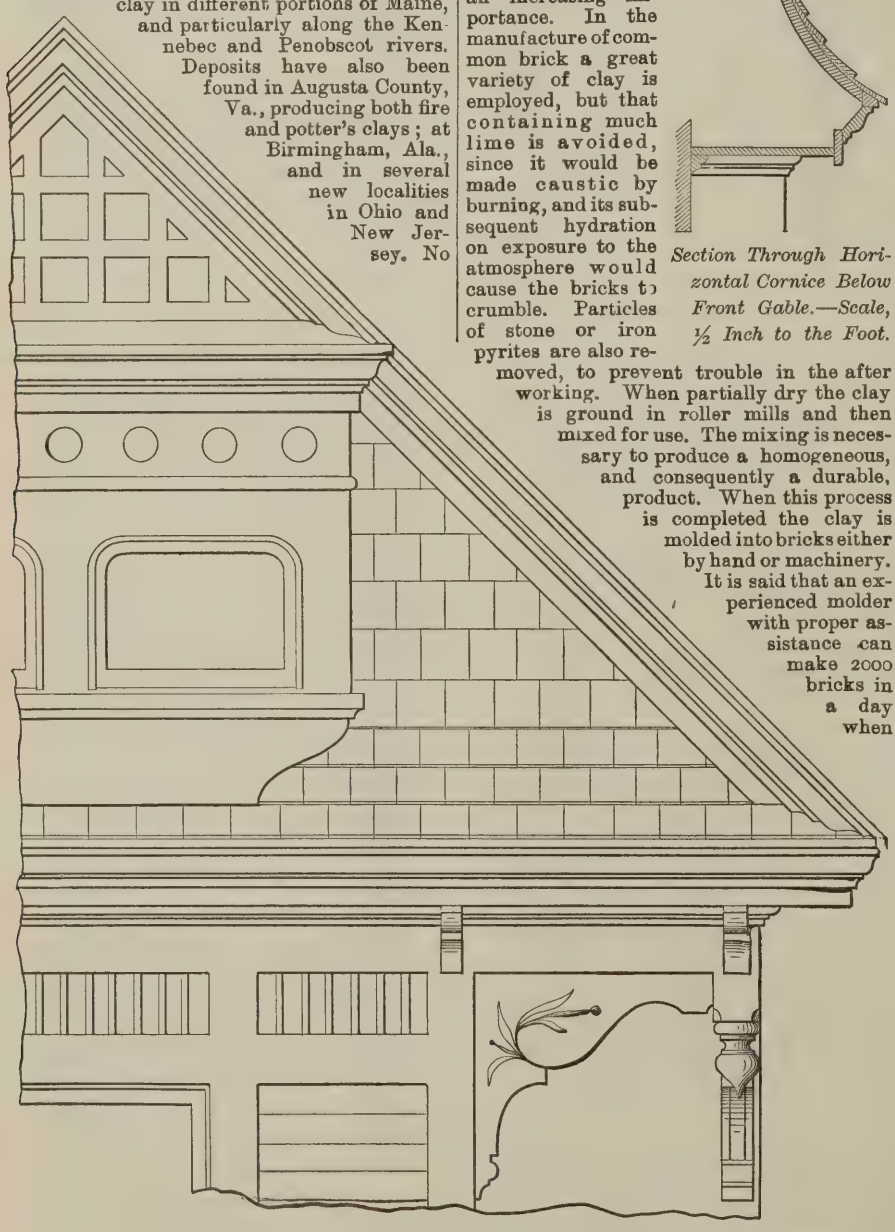


*Details of House Shown in the Plates.—Side Elevation of Steps to Front Porch.—Scale, ¼ Inch to the Foot.*

estimated cost of this house, built in the neighborhood in which the author resides, is slightly under $4600.

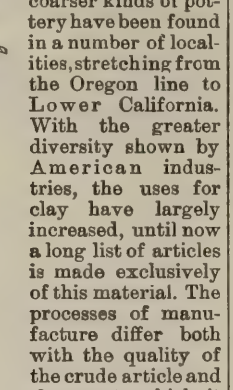
## American Clays and Their Use for Constructive Purposes.

In addition to the localities already known, further geological researches have disclosed the occurrence of large deposits of brick clay in different portions of Maine, and particularly along the Kennebec and Penobscot rivers. Deposits have also been found in Augusta County, Va., producing both fire and potter's clays; at Birmingham, Ala., and in several new localities in Ohio and New Jersey. No



*Detail of Side Gable.—Scale, ½ Inch to the Foot.*

new finds are reported in the Rocky Mountain division, but in California clay deposits of some importance have recently been discovered in several portions of the State. An excellent quality of kaolin, or porcelain clay, occurs at Calico, in San Bernardino County. Clays suitable for making the coarser kinds of pottery have been found in a number of localities, stretching from the Oregon line to Lower California. With the greater diversity shown by American industries, the uses for clay have largely increased, until now a long list of articles is made exclusively of this material. The processes of manufacture differ both with the quality of the crude article and the uses to which it is to be put. They have just now, however, a greater interest than usual, since the high price of lumber and the desire to make our structures more fire-proof than formerly have operated to invest all mineral constructive materials with an increasing importance. In the manufacture of common brick a great variety of clay is employed, but that containing much lime is avoided, since it would be made caustic by burning, and its subsequent hydration on exposure to the atmosphere would cause the bricks to crumble. Particles of stone or iron pyrites are also removed, to prevent trouble in the after working. When partially dry the clay is ground in roller mills and then mixed for use. The mixing is necessary to produce a homogeneous, and consequently a durable, product. When this process is completed the clay is molded into bricks either by hand or machinery. It is said that an experienced molder with proper assistance can make 2000 bricks in a day when working by hand. The molded bricks are permitted to partially dry in the sun, and are then stacked in kilns for burning. The fuel varies, but when available an-

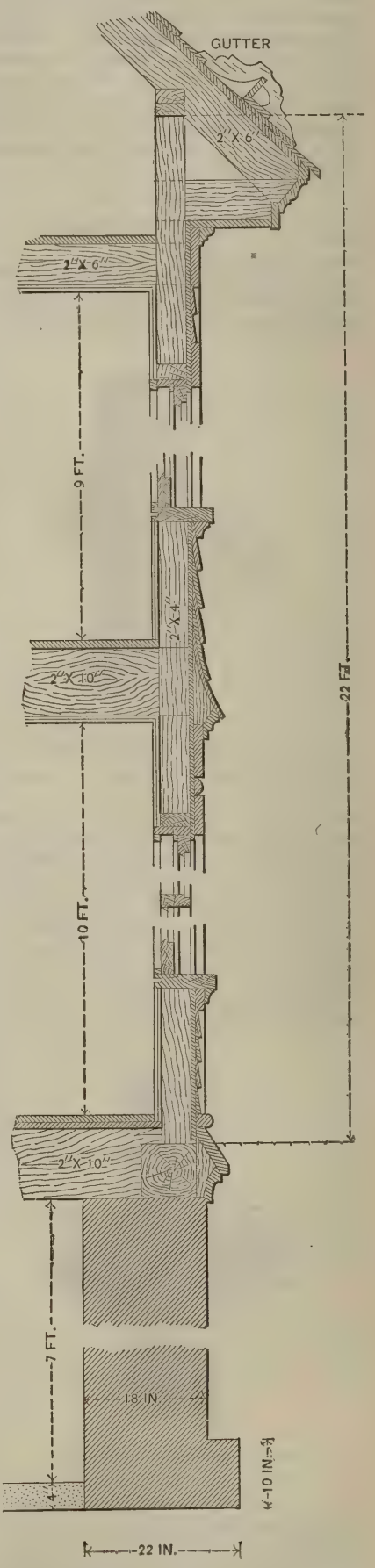


*Section Through Porch Cornice.—Scale, ½ Inch to the Foot.*



*Section Through Horizontal Cornice Below Front Gable.—Scale, ½ Inch to the Foot.*

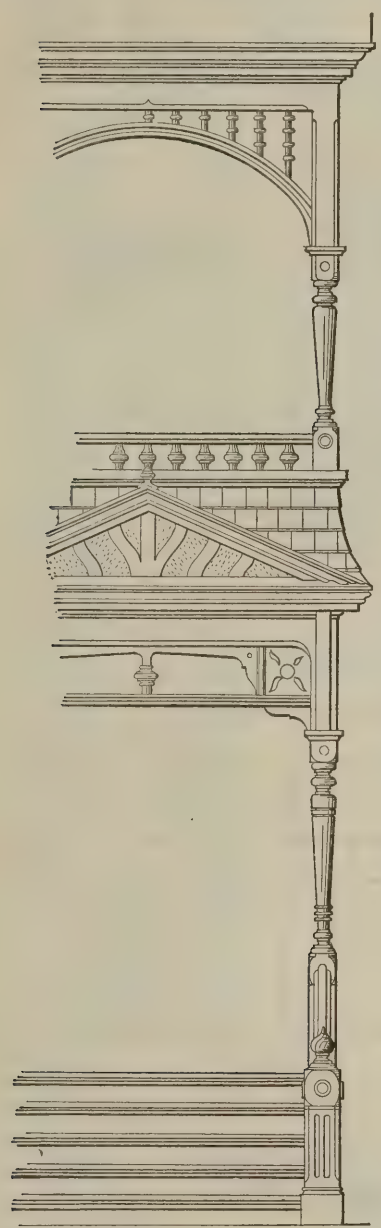
thracite screenings are usually employed. With coal the burning requires from four to six days, and the cooling of the kiln about the same time. Building brick for




*Section Through Outer Wall.—Scale, ½ Inch to the Foot.*

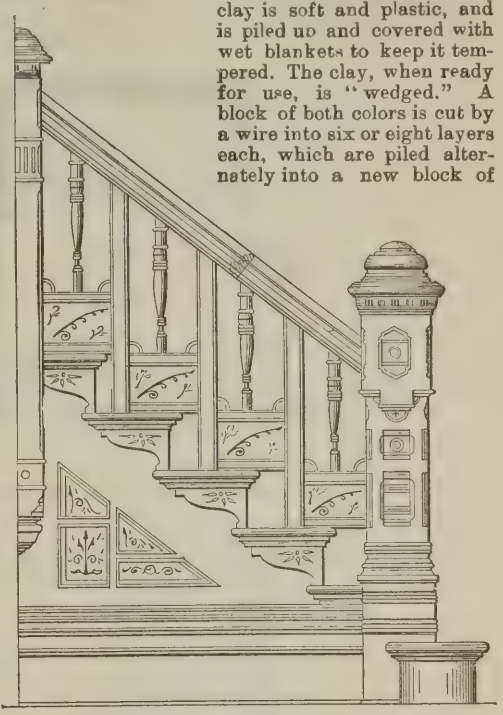
city fronts and the better class of work are made in the same manner, except that better clay is used, and the operations are more carefully performed. Pressed brick, such as are made at Baltimore with success, are molded larger than required, and then

compressed to the proper size in a brick press. The color and smoothness depend upon the molding sand employed. All of the operations are conducted under cover, and the bricks are laid on their faces in drying instead of on end, as with the commoner kinds. Special precautions are also required in firing. The arches and four or five lower courses are made of common brick, and the pressed brick on top of these. The burning requires from 10 to 12 days. The bricks are allowed to cool slowly, and when taken from the kiln are sorted, the defective ones being rejected. The ornamental and intaglio bricks now so popular are made in a similar manner, save that even greater care is required.

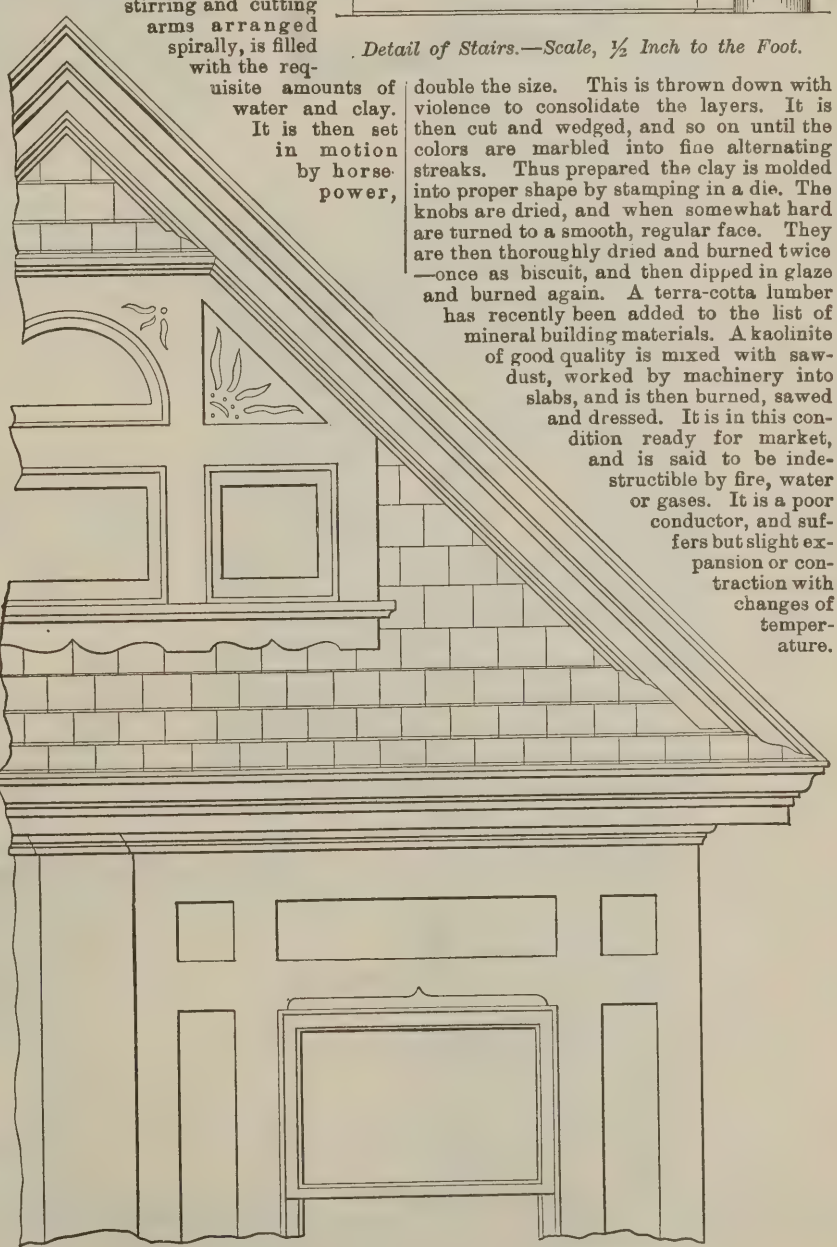


*Details of Front Porch.—Scale, ¼ Inch to the Foot.*

Glazed brick are now largely used for both interior and exterior decoration. They are manufactured in Ohio and elsewhere in the United States. For this purpose an ordinary red or light-colored brick is used, and a suitable enamel produced on the surfaces to be exposed. Some colors are very easily obtained. A simple lead glaze on a cheap buff fire-brick makes a good yellow. A manganese and iron glaze is used for black. White and blue are the most difficult to produce, since the red color of the ordinary brick must first be hidden by an opaque layer of white before the finishing glaze is applied. Green must be made in the same way. Roofing tiles are made by ordinary brick clay. This is first molded into strips about 6 inches wide and ⅜ inch thick, and is then cut into desired lengths. Oil is used to keep the clay smooth and prevent the plates from sticking. A specially devised machine then trims off the edge of the plate to a symmetrical shape, and presses it to the desired pattern. It takes about two weeks in a steam-heated chamber to dry the tiles, as the oil hinders the escape of moisture. They are piled loosely in a kiln to a depth of 6 feet, and subjected to a slight firing. Several designs of tile are made. The shingle tile is simply a slab of burnt clay 12 x 6 x ⅜ inches, having suitable holes for the nails to pass through which hold them to the roof. The diamond tiles hook into each other, and are more ornamental, but less durable. The chief objection to roofs of this character is in their excessive weight. A 10-foot square of plain shingle tile weighs about 1100 pounds; of the diamond tile, from 650 to 850 pounds. The manufacture of door knobs as carried on at East Liverpool, Ohio, is of considerable interest, since it requires a careful mixing of the different clays to obtain a well-marbled product. Each color of clay is worked separately and is first put through a process called boiling. A vertical cylinder about 6 feet in diameter, and carrying in the center a revolving rod provided with stirring and cutting arms arranged spirally, is filled with the requisite amounts of water and clay. It is then set in motion by horse-power, and the clay beaten to a thin mud or slip. This is run through a fine bolting cloth into a large tank, from which it is dipped into an evaporating pan heated by suitable furnaces. When removed from the pan the clay is soft and plastic, and is piled up and covered with wet blankets to keep it tempered. The clay, when ready for use, is "wedged." A block of both colors is cut by a wire into six or eight layers each, which are piled alternately into a new block of double the size. This is thrown down with violence to consolidate the layers. It is then cut and wedged, and so on until the colors are marbled into fine alternating streaks. Thus prepared the clay is molded into proper shape by stamping in a die. The knobs are dried, and when somewhat hard are turned to a smooth, regular face. They are then thoroughly dried and burned twice—once as biscuit, and then dipped in glaze and burned again. A terra-cotta lumber has recently been added to the list of mineral building materials. A kaolinite of good quality is mixed with sawdust, worked by machinery into slabs, and is then burned, sawed and dressed. It is in this condition ready for market, and is said to be indestructible by fire, water or gases. It is a poor conductor, and suffers but slight expansion or contraction with changes of temperature. Its weight is put down at one-half that of brick. It can be worked with edge tools, bored and sawed, and holds nails as readily

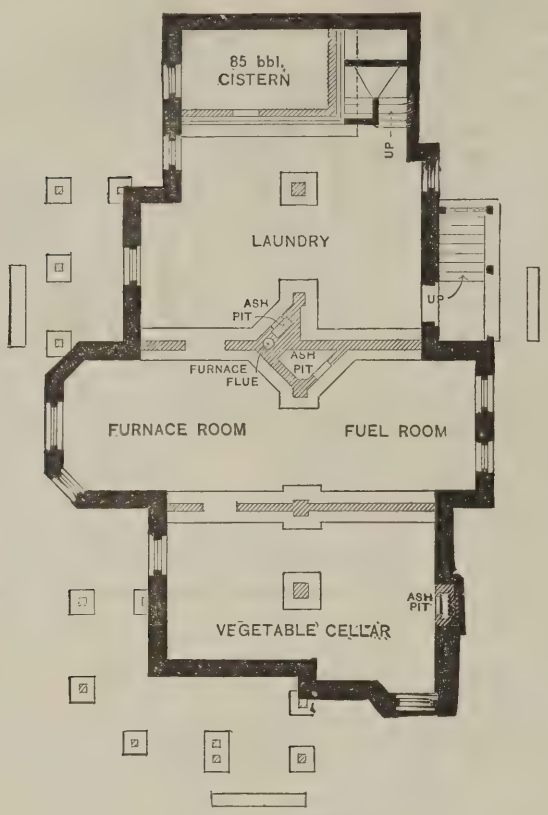


*Detail of Stairs.—Scale, ½ Inch to the Foot.*

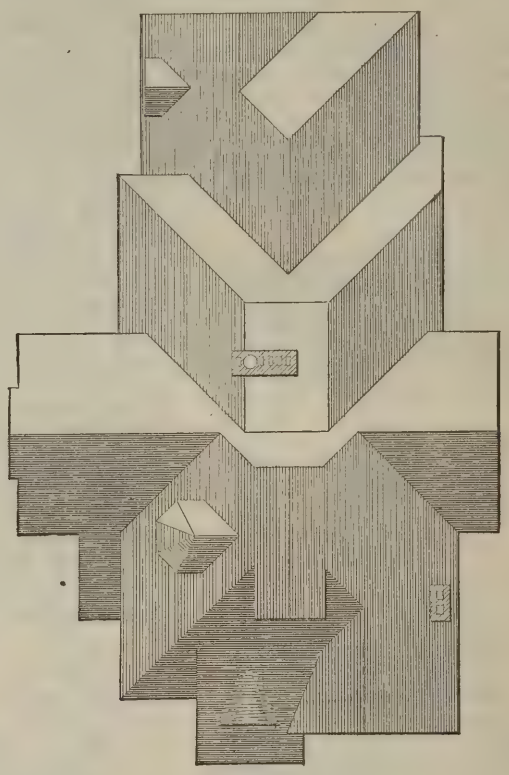


*Detail of Front Gable.—Scale, ½ Inch to the Foot.*

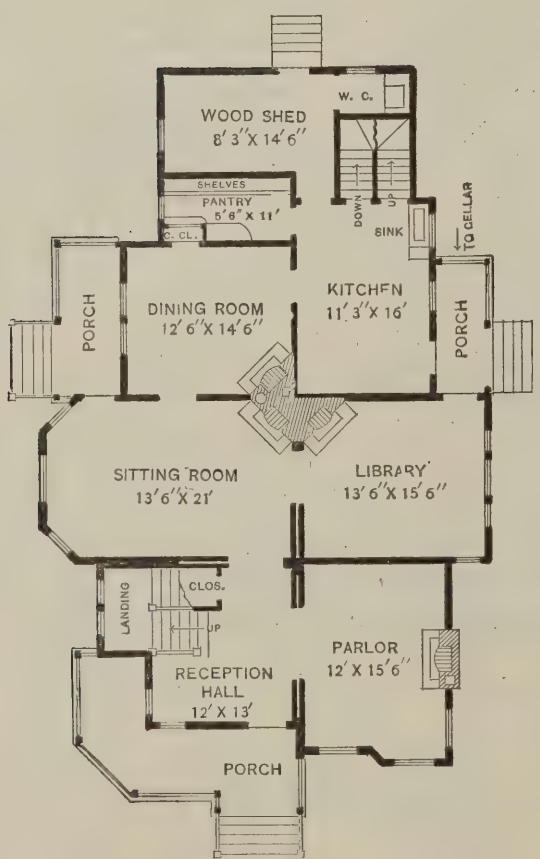
as timber. It is also made into hollow tile and fire-proof casing. Mr. Wilbur's report to the Government, from which our information is taken, also gives the statistics of production of the United States, together with the imports and exports.



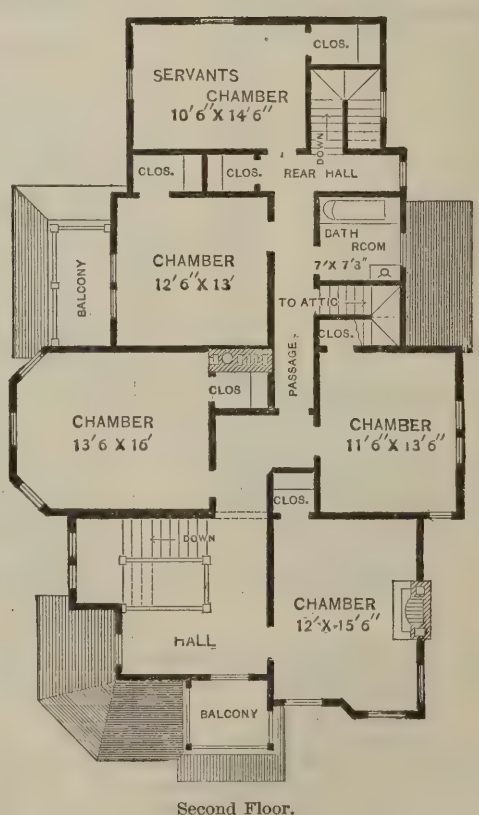

Foundation.



Roof.




First Floor.

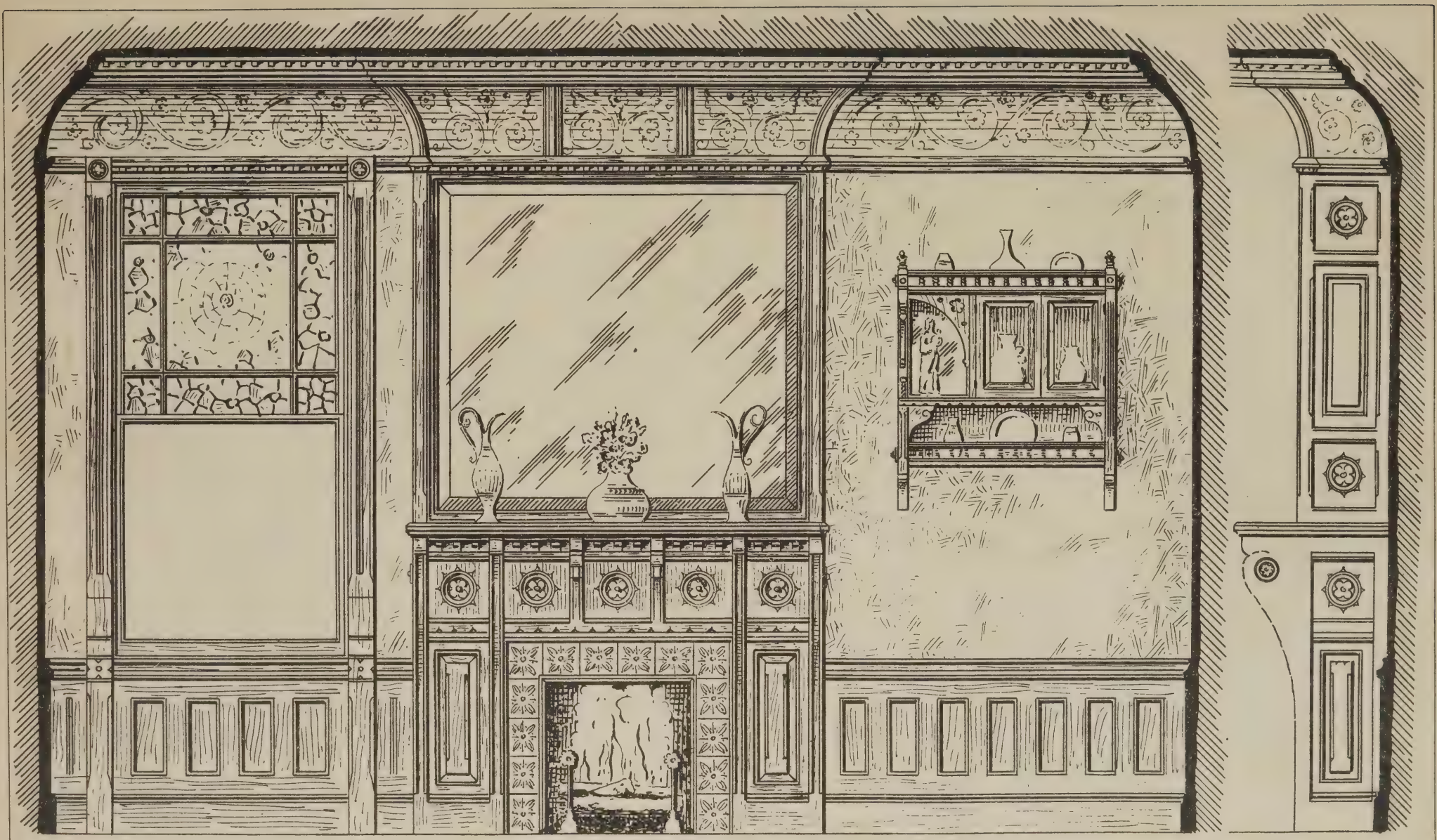



Second Floor.

*Plans of House Shown in Plates.—Scale, $\frac{1}{16}$ Inch to the Foot.*

## Gumming Saws.

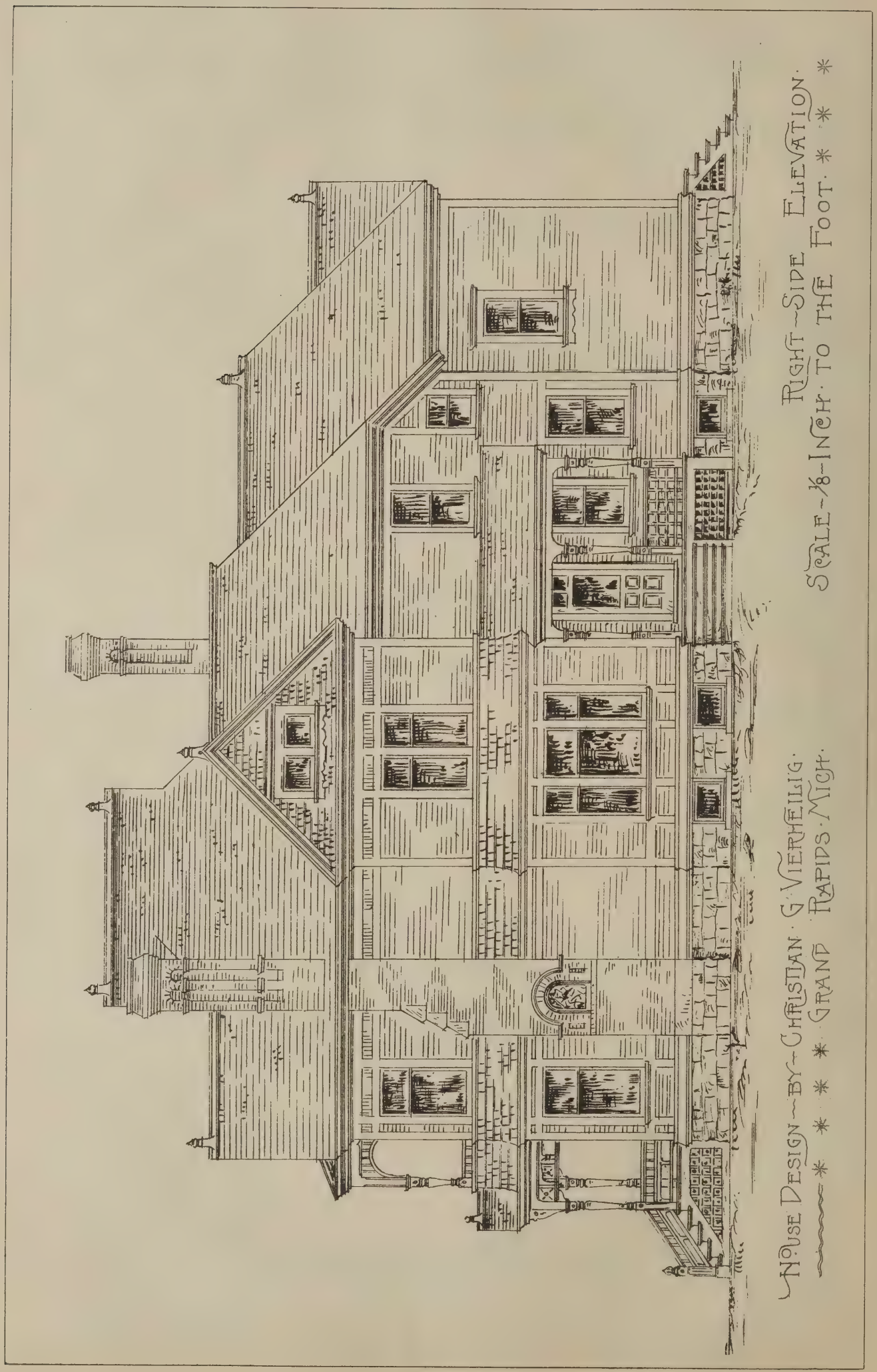
Emerson Smith says that many persons who are not fully acquainted with the principle upon which circular saws are made entertain the erroneous opinion that a saw should work the same until worn out, if it is not accidentally sprung in use or strained in gumming. So far as any damage to the saw is concerned, there is no difference between the use of a burr gummer or a file; but if proper care is not exercised in the use of the emery-wheel there is more danger from its use than from either the file or burr. If the condition of the saw is such that a considerable depth is required to be cut into the plate, the operation should be performed by going over the saw several times, only allowing the wheel to grind away so much as can be done without heating the saw to a blue. There is no excuse whatever for crowding the emery-wheel so as to heat the saw red hot, as this is sure to injure the saw, often glazing it where the wheel comes in contact so hard that a file will make no impression whatever. From these hard spots on the outer surface small cracks commence, invisible at first to the eye, but gradually enlarging until they become dangerous fractures. Hacking the face of the wheel with a cold chisel or the corners of an old file will often prevent its glazing, so that it



STUDY IN INSIDE FINISH BY H. P. MILLER, ARCHITECT.
PHILADELPHIA, PA.

APPROXIMATE SCALE—
9/16 INCHES TO THE FOOT

PLATE XXXIV.



HOUSE DESIGN—BY—CHRISTIAN G. VIERHEILIG.
* * * * GRAND RAPIDS, MICH.

RIGHT—SIDE ELEVATION.
SCALE—⅛—INCH TO THE FOOT. * * *

PLATE XXXV.

* PERSPECTIVE VIEW.

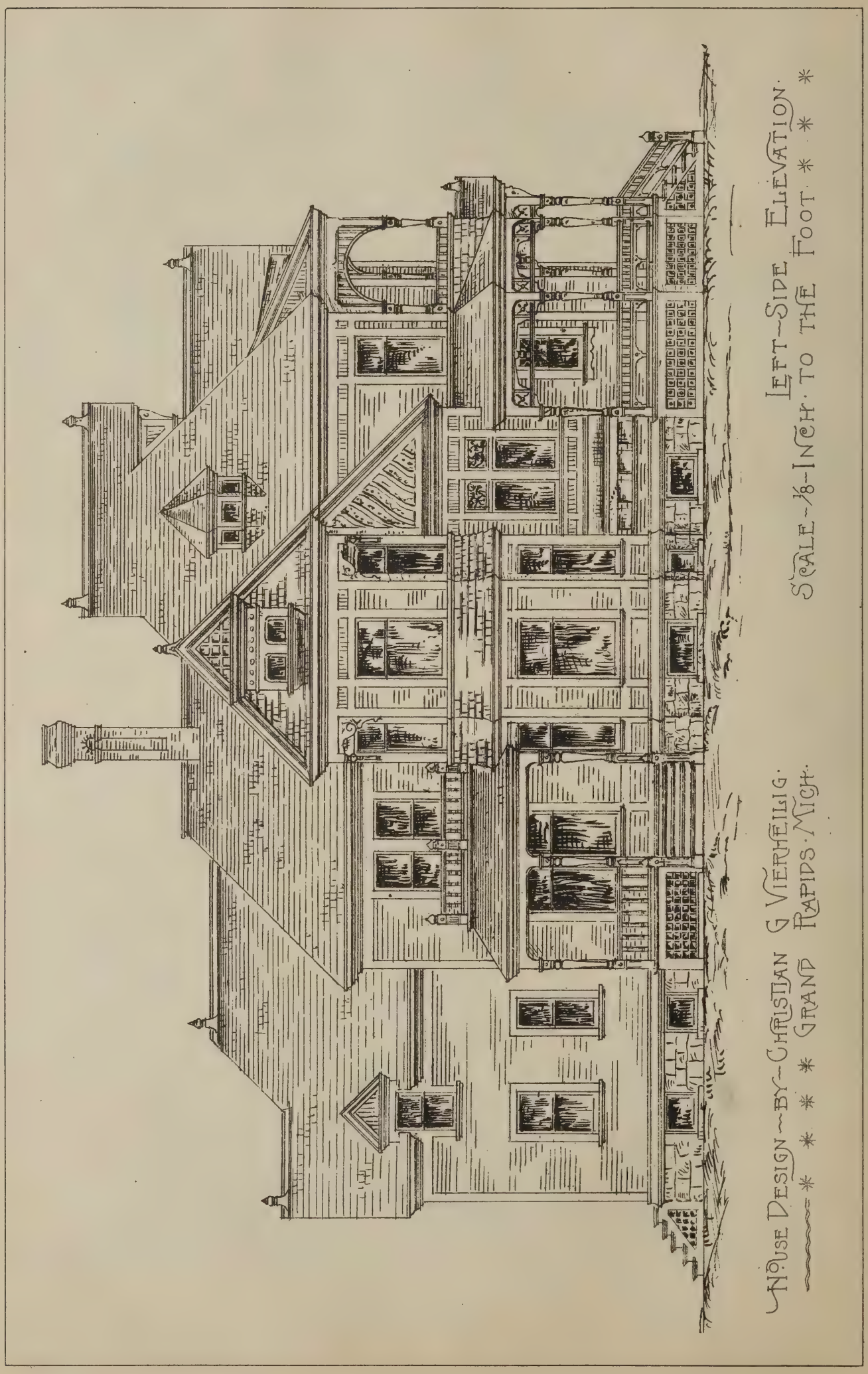
Front Elevation

Scale 1/8 inch to the Foot

HOUSE DESIGN—BY—CHRISTIAN G. VIERHEILIG.

* * * * GRAND RAPIDS, MICH.

PLATE XXXVI.



No. USE DESIGN—BY—CHRISTIAN G. VIERHEILIG.
* * * * * GRAND RAPIDS, MICH.

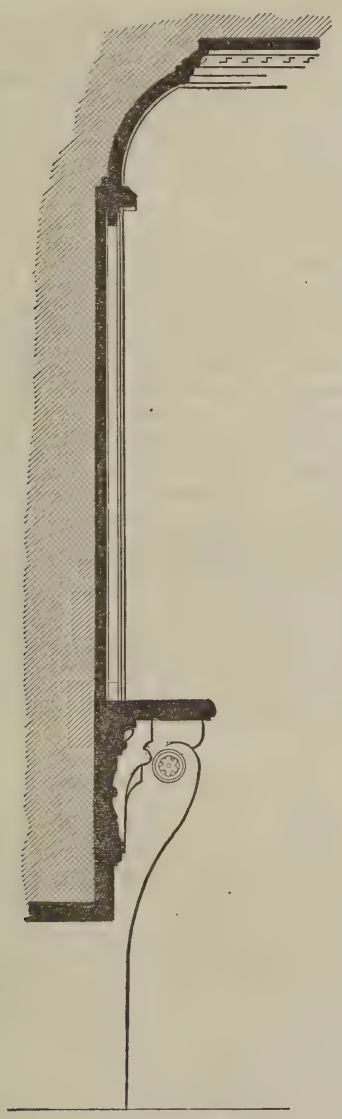
LEFT-SIDE ELEVATION.
SCALE—1/8-INCH TO THE FOOT. * * *

is not as liable to heat the saw. After a few times gumming, however, the saw will enlarge on the rim, so that the slightest warmth will cause it to buckle, and there is no remedy left but to send it to a saw-maker and have it rehammered. Some, however, entertain the erroneous impression that a saw rehammered will never run as well as when new. On the contrary, a saw rehammered will generally run better than when new, because all the elasticity, or nearly all, is worked out of the saw by using, and it generally works stiffer than when new.

## CORRESPONDENCE.

### Criticisms of the Prize Designs.

We have a letter from some one who evidently lacks the courage of his convictions. He does not indicate his residence nor does he sign his name. It is not customary for



*Details of Study in Interior Finish.—Vertical Section Through Mantel.*

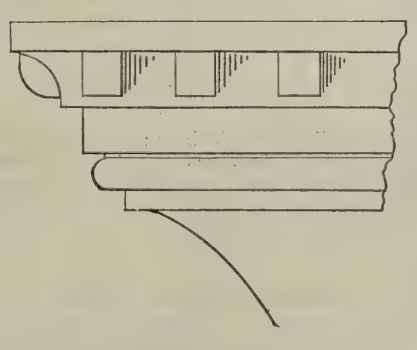
editors to notice anonymous contributions. A name is always insisted upon, not necessarily for publication, but as evidence of good faith. We make an exception in this case for the reason that our correspondent raises certain points which are perhaps of interest to our readers. Therefore we proceed to discuss them. The letter is as follows:

"In looking over the prize designs in the Seventeenth Competition I notice certain things which I should like to have explained. I offer these remarks not in the sense of finding fault, but in the hope that the ideas of readers of the paper will be drawn out, and thus give me reason for changing mine if I am wrong. I have always supposed that it was desirable to have a parlor and sitting-room adjacent and connected by a sliding door, without any intervening hall. Again, persons living in ordinary houses cannot afford to have both a cook and a waiter. They manage to get along with a single servant who does both cooking and waiting at the table. Therefore I think it desirable to have the kitchen and dining-room connected, instead of going from one room to another through the china closet or pantry. Both china closet and pantry should be kept clean, and therefore they should not be used as passageways. The dining-room and kitchen should not be seen from the front of the house, and they should be side by side. There should be no door from the kitchen into the front hall, and in all cases going to the cellar from the front hall should be avoided. There should be room in the sitting-room and parlor for an old-style piano, not an upright, without obstructing the window. There should be at least one bedroom, large enough to hold two beds, or better, a bedroom connected by a door with another room. No parlor or sitting-room should be less than 14 feet wide."

*Note.*—Our correspondent, whoever he may be, intimates at the outset that his criticisms apply to the prize designs in our last

*Rosette.—Scale, 3 Inches to the Foot.*

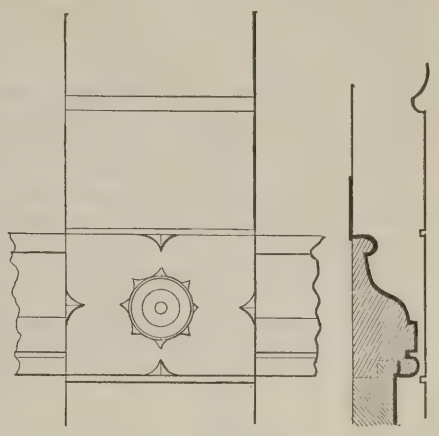
contest. He does not particularize, and his so-called criticisms assume a very peculiar form. He indicates that he has been persuaded by his education or general environment that certain peculiarities of house planning and household management are best, if not absolutely essential. Upon this dogmatic platform he proceeds to tell what should and what should not be done in the planning of houses. Were it not that he intimates at the outset that his views are subject to revision in the light of such opinions as others may express, we should have very little patience in dealing with his communication. As already intimated, coming as it does without signature or address, it is entitled to no attention at our hands. Nev-



*Cornice.—Scale, 3 Inches to the Foot.*

ertheless, we will forego the usual rules in such cases and answer it briefly.

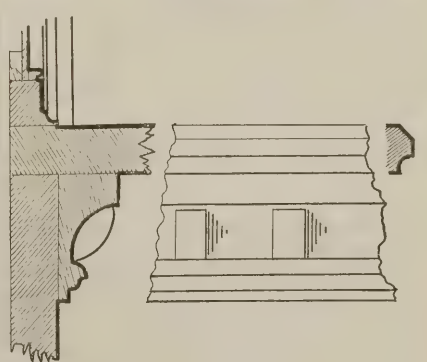
It must be admitted that, so far as example goes, there are many precedents why parlor and sitting-room should be adjacent and connected by a sliding or folding door, but aside from the fact that the conventional plan employs this feature there would seem to be no reason for the rule. In the planning of houses, as well as in other matters,



*Window and Door Trimming.—Scale, 3 Inches to the Foot.*

it seems to us that individual preferences should exercise full sway. One housekeeper may prefer connected parlor and sitting-room; others may prefer a parlor off to one side. Some people use their parlors; others keep them locked up, carefully excluding the sunlight and otherwise making them chambers of horrors. The reply to this point, as well as to some others, therefore, is that there is no rule in such matters except that of individual taste.

With reference to the location of the dining-room and kitchen, which our correspondent says should in no case be visible from the front of the house, but immediately adjacent to each other, and with direct communication rather than with the passage through pantry or china closet, or through a hall, it is also to be said that tastes differ. In some houses people feed; in other houses people eat, and in still others they dine. In some houses the dining-room is so cheerless a place that the shortest possible time is spent in it. Food is bolted, and the room is deserted at the earliest possible moment.

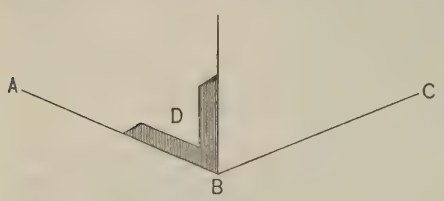


*Bed Molding Under Mantel.—Scale, 3 Inches to the Foot.*

In other houses the dining-room is one of the pleasantest rooms in the house, and the family lingers there over meals, and social converse is added to the delights of the table. For such reasons people with fine sensibilities and artistic tastes prefer the most cheerful corner of the house for the dining-room, and they take care that its windows overlook the lawn, garden or otherwise have a pleasant view. Sometimes a conservatory is attached. Such people like to have the kitchen, with its heat and smell of cooking, as far removed as possible. Two doors are absolutely necessary under the circumstances. As to keeping the pantry and china closet clean, no one will dispute the desirability of such a course, but cleanliness does not necessarily turn upon lack of use. We have seen many a house in which the passage from dining-room to kitchen was by way of the pantry, and in which the pantry was cleaner than in some other houses where the arrangement and manage-

ment were more of the character that our correspondent describes. Tastes differ in this as in other features of house planning. A door from the kitchen to the front hall is likewise a matter of taste and convenience. Direct communication to the front door for the servant, in case but one servant is employed, is desirable. Going down cellar in the front hall we do not think is a good plan, and yet we have seen houses that were neatly kept in which this feature occurred and in which it gave no offense. Sometimes this plan is introduced simply by way of economy. All this illustrates what we said at the outset, that there are no fixed rules in the planning of houses, but every one has the right to employ features suiting himself. What will suit one it should be remembered will not necessarily suit another.

Our correspondent is not content with complaining of architectural features, but must have his fling at the modern upright piano.




*Bevels for Octagon Roofs.—Fig. 1.—Angle of the Octagon Bisected.*

He insists upon it that both sitting-room and parlor should be adapted to receive an old-style square piano. Are fashions never to change, or are old things never to passs away? Is there no utility in the modern upright piano, and must the old box-like affair sustained by four legs always be maintained, simply because it has long use to sanction it? For our part we prefer the modern upright piano many times over to the old style of instrument, and from practical familiarity with it we are prepared to accord it a rank far above that of its predecessor. In this connection we may mention that so well appreciated is the modern upright piano that several leading manufacturers whose names might be mentioned have entirely given up the manufacture of square and grand pianos, and are holding themselves exclusively to the manufacture of uprights. Our correspondent evidently is behind the times. He is deeply prejudiced in favor of old ideas and he seems prepared to combat anything that is new. Whatever is new is apparently necessarily bad, in his estimation.

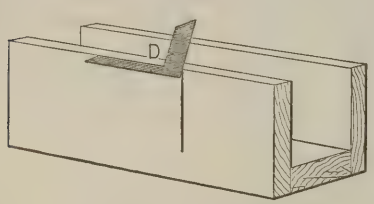



*Fig. 2.—Miter-Box for Cutting Horizontal Parts.*

With reference to bedrooms almost every one will agree that with small children a bedroom large enough for two beds, or in sickness a bedroom large enough for a bed and a couch for an attendant, is desirable. With modern folding beds, however, there

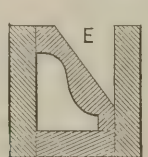



*Fig. 3.—Sectional View of Miter Box.*

is less need of large space than formerly, for the bed that is only occasionally used can be kept in very small compass. Communicating bedrooms in some cases are also desirable. The dimensions of a parlor or sitting-room which our correspondent mentions are arbitrarily named. In this case, as in others mentioned, circumstances alter cases. With reception halls and with rooms arranged to be thrown together in case of a large assembly of company there is less need of large single apartments. Small, cozy rooms have their advantages and a large room is at times inexpressibly dreary, especially if there be but one or two persons in it. In these remarks we do not wish to forestall the opinions of our subscribers, which it seems this correspondent desires. We shall be glad to hear from any who have opinions to express.

### Bevels for Octagon Roofs.

*From* "CYMRO," *Cincinnati.*—Referring to a recent communication published in *Carpentry and Building*, I beg to call to the attention of "W. S. W." my plan for finding bevels for octagon roofs. I think it is simple and correct. It is illustrated by the accompanying sketches. In Fig 1, A B C is the angle of the octagon. By bisecting this angle there is obtained the bevel D, which is correct for the miter of the cornice, and this application is shown in Fig. 2, where the lines for making the cutting box are shown. The box should be made to fit the pitch of the molding, as illustrated in the sectional view. In order to get the bevels to cut the boards, proceed as follows: Take a piece of wood, say 3 x 3 inches in section and one foot long, and make it square; then apply the bevel D, as shown in Fig. 4, and cut the end off. Next take a bevel same as the pitch of the roof and with it bevel the piece of wood from the longest side, calling F H the base; then square off the corner G with the stock of the square on the beveled side. This is all that is necessary to be done. Set the bevel with the cuts thus obtained and apply it directly to the boards.

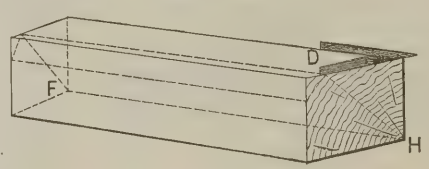



*Fig. 4.—First Step in Getting the Bevel for the Inclined Parts.*

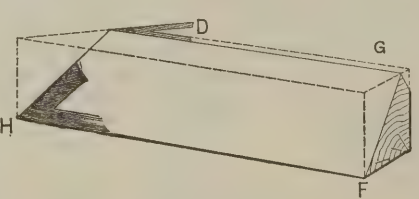


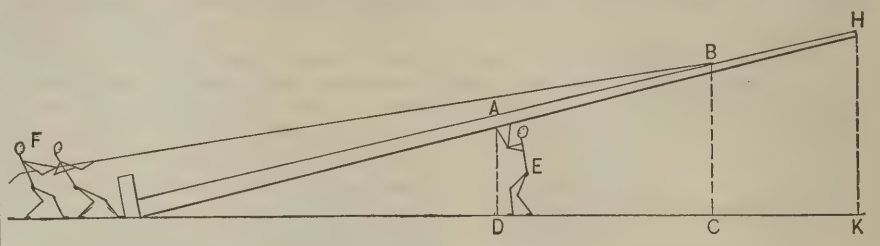

*Fig. 5.—The Required Bevel Indicated.*

### Folding Staging Bracket.

*From* S. F. R, *Laconia, N. H.*—In the description of the folding staging bracket which appeared on page 152 of the August issue there were one or two errors which I desire corrected. The ledgers, instead of being 3 x 4 inches, which would make the article very clumsy, are of ¾-inch stuff. This no doubt has been discovered by those who have examined the illustrations. The bolts are 3¾ inches x $\frac{5}{16}$ inch.

### Easiest Manner of Raising a Pole.

*From* G. C. R., *Chicago, Ill.*—Will you please settle the following question, and also give reasons for your decision? The accompanying cut shows some men in the act of raising a pole. I contend that the rope is tied in the right place at B, but others say that it ought to be fastened at A. Who is right?




*Easiest Manner of Raising a Pole.*

*Answer.*—Our correspondent is right in arguing that the rope should be fastened at B rather than at A, though if he would fasten it at H, the further end of the pole, the lifting would be accomplished with even less labor. In answering the question we have assumed that effort is not applied to the rope until after the assistant E has raised the pole above his head, as shown in the cut. If the pole were laid flat on the ground and were of any considerable weight no ordinary man could budge it by pulling in the way indicated, for the direction of effort would so nearly coincide with the pole itself that the vertical resultant, to express it mathematically, would be little more than zero, and consequently insufficient to disturb the pole. Speaking in a broad and general manner, we may state as a reason for fastening the rope at H that the purchase or leverage is greater. The pole being fulcrumed at the earth, the leverage in different cases will be equal to the distance from the point assumed to the earth. In the figure these lever arms are A D, B C and H K, the last evidently being the longest. To give an exact mathematical explanation of the result of the acting forces in this problem would call for diagrams and calculations which would involve considerable labor, and when finished we doubt very much if our readers would find the solution intelligible. We will therefore brave the charge of inexactness for the sake of being simple and understandable.

### Timbering Buildings.

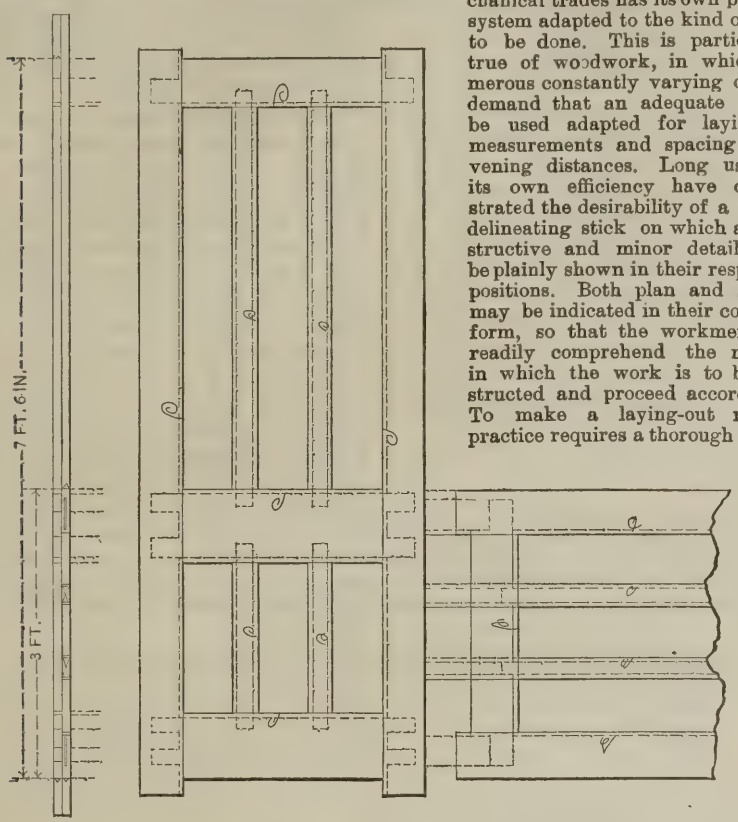
*From* R. N. P., *La Crosse, Wis.*—I was surprised at the Editor's answer to a correspondent's letter in the January number, on the subject of framing plans. Some time since I saw a building intended for a barn that was 60 x 80 feet in plan which had been built to plans in which no sizes of timbers were given. The contract had been let to the lowest bidder. The largest timber put into it was 2 x 4 inches. The joists were 2 x 4. The barn looked well enough outside, and was able to stand alone, but the first load of hay that was put into it broke down the floor. In this city, in the year 1873, there was a building put up intended for a grist mill. It was 40 x 60 feet in size, and two stories in hight. The studding employed was 2 x 4 inches, with a ribbon 1 x 3 inches gained into the studding for the joists to rest upon. The joists were 2 x 8 inches, 20 feet long, and placed 16 inches between centers. The girders were 8 x 8 inches, and placed 20 feet between bearings. This building also looked well enough outside, but the first lot of grain that went into it caused it to assume a shape that induced the owner to send for me to prop it up. I could tell of a great many more buildings defective in the same general way. It seems to me that it is not surprising that we so often hear of buildings tumbling down in New York City if the contractors there are allowed the discretion that the Editor's answer to his correspondent would seem to indicate.

*Answer.*—The writer of the above seems to have misapprehended the nature of our remarks in connection with the inquiry

from a correspondent whose letter was published in the January number. Certainly we made no reference to the sizes of timbers to be employed, and we had no intention to suggest that the dimensions of timbers be left entirely to the discretion of the builder. The question for consideration was the desirability of architects furnishing framing plans. There is a vast difference between a plan showing how timbers are to be placed in a building and a specification which shows what dimensions of timbers are to be employed. It is right for the architect or the engineer to prepare his specification, and if he be competent to do so, and the building be one in which special construction is desirable, there is no harm in his preparing the framing plans—indeed it would be his duty to his client to do so. What we objected to was the demand upon the architect in the case of an ordinary dwelling for a set of framing plans, the only possible use of which could be to supply the deficiencies in the mechanical and executive skill of the builder in charge of the work. We said nothing against specifications. We would by all means have specifications very carefully prepared, leaving the smallest possible amount of discretion to the builder. In the case of the barn and the grist mill which our correspondent describes we venture to say that the builders in both cases complied with their specifications. In other words, in the absence of specifications they put up buildings that had the semblance of strength, employing such timbers and such construction as best suited their profits. Our remarks with reference to framing plans should not be construed to mean opposition to such plans as are prepared for the purpose of indicating the sizes of the timbers to be employed and their general arrangement. We only objected to the architect doing that for which by education and experience he seems less qualified than the builder. The plan of letting buildings to the lowest bidder, irrespective of his responsibility and his qualifications for doing the work, is bad on general principles. The best work is seldom secured by such management. The examples of bad building which our correspondent cites may be owing quite as much to this method of disposing of contracts as to any other reason. Certainly it does not turn on the question of framing plans.

**Laying-Out Rods.**

*From* O. B. M., *New York City.*—Definite system is an absolute necessity in all kinds of construction. Each branch of the mechanical trades has its own peculiar system adapted to the kind of work to be done. This is particularly true of woodwork, in which numerous constantly varying designs demand that an adequate system be used adapted for laying off measurements and spacing intervening distances. Long use and its own efficiency have demonstrated the desirability of a rod or delineating stick on which all constructive and minor details may be plainly shown in their respective positions. Both plan and section may be indicated in their complete form, so that the workmen may readily comprehend the manner in which the work is to be constructed and proceed accordingly. To make a laying-out rod in practice requires a thorough knowledge of plans and ability to read them readily. Demonstrations are transferred from the plans to the rod, which it is usually the duty of a foreman or expert workman to prepare. The method pursued, however, is comparatively simple and might perhaps be explained without sketches, but a clearer understanding will be best reached by illustrating the rod and some of its applications.




*Laying-Out Rods.—Fig.* 1.—*Vertical and Horizontal Projection of Door, Showing Application of Rod.*

By referring to Fig. 1 of the sketches, it will be seen that a six-panel door, 1¾ inches in thickness, 3 feet wide and 7 feet 6 inches high, is called for. A rod suitable for laying it out would be about 8 feet long, 2 inches wide and 1 inch thick. Commence by drawing a line down the center of the rod, thus dividing it in two equal margins, or to simplify matters use both sides of the rod. Then, beginning at the bottom of the bottom rail, lay off the full hight of the door and the full width of the bottom rail, and square across one margin or one side, according to the way in which the rod is being used. Likewise lay out the lock rail and top rail on the same margin or side. On the other, proceed to show the full width of the door, marking the stiles and the mullions as indicated. This will give all the solid framing. Now mark the depth of the plowing for the panels on the inside of the width of the stuff and square across, showing the length of the tenons, depth of mortises on stiles and the breadth of the tenons; likewise the relish of the rails. Finish by placing an abrupt stop-mark on the extreme outside measurements. From the vertical projection B it can be readily understood how the rod A is applied to each piece, and the full size working dimensions marked neatly thereon with a sharp laying-out knife, and squared across, as on the rod, with the exception of the mortises and tenons. These running parallel to the face of the projection are ruled with a mortise gauge from the "tried" or "faced-up" side. This is distinguished by the familiar mark for "face side" and "edge," in Fig. 1. The horizontal projection is similiarly managed. Dotted lines in the projection represent plowing, tenons, mortises and relish. As the thickness of tenons and width of mortises are generally one-third of the thickness of the work, it is manifestly unnecessary to show them on the rod. The principle here explained applies to all doors of whatever nature. Where the doors have curvilinear heads there is of course the necessity of indicating the springline joint and the crown of the curve and center. If the curve be cut out of a solid piece or of a number of pieces to fit a square door frame there must also be the indication of framing of the pieces into the stiles. Folding or sliding doors come under the same rule, with the addition of finish at the joint. This is usually rebated or beaded. Sometimes it is finished withan astragal, according to the specifications. Sash, the acme of every young joiner's ambition, are more complicated. To a beginner they seem extremely difficult, but a glance at Fig. 2 will show how easily the rod may be applied to such work. The rigid rule

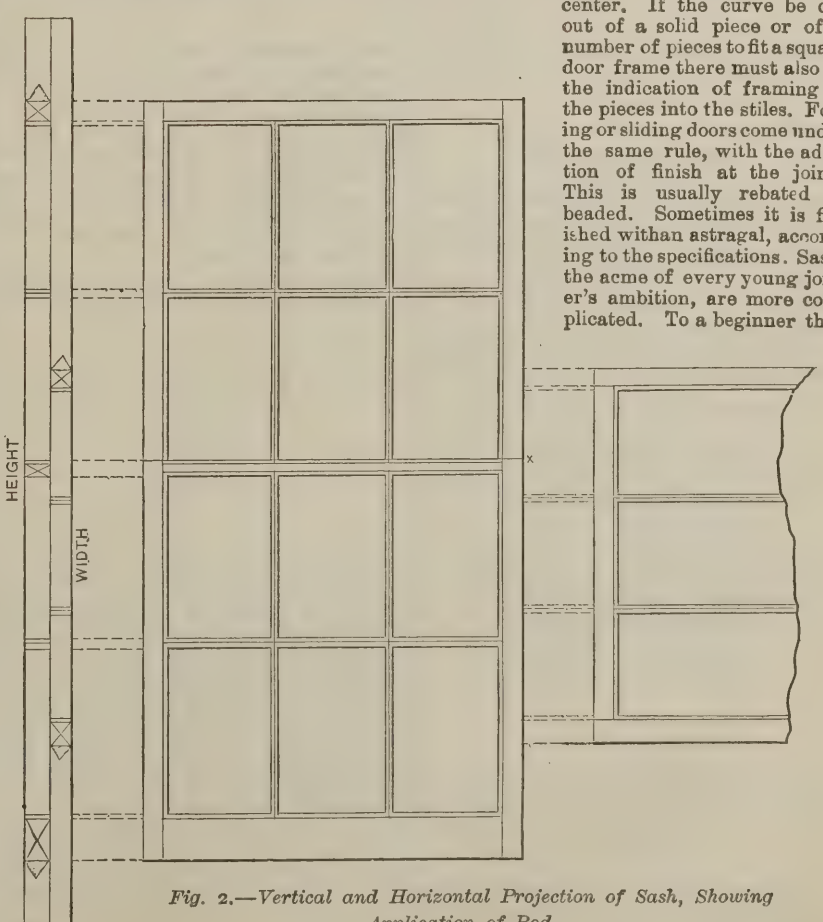
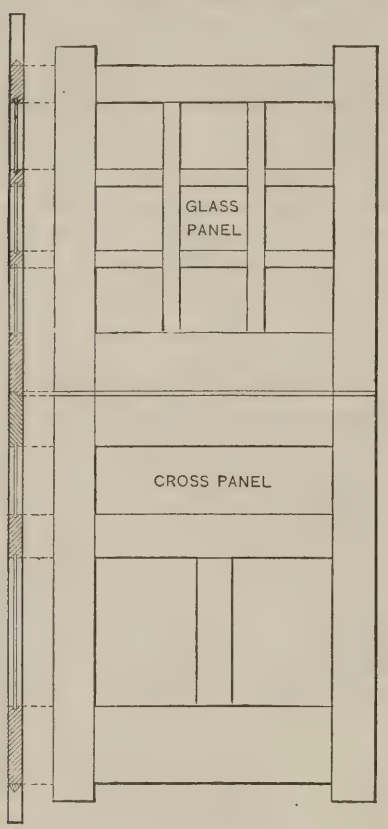



*Fig.* 2.—*Vertical and Horizontal Projection of Sash, Showing Application of Rod.*

of care and exactitude must still be closely observed, however. Examination of the rod discloses that the stuff is to be laid out for one pair of sash, or sash for one window. The sash being of the six-light variety, 2½-inch stiles and top rail, 5-inch bottom rail, 1½-inch meeting or check rail and ⅞-inch bars. If the reader has never made a sash it will be profitable for him to reason this sketch out. This is true, because sash become more confusing after the insertion of the bars, increasing in proportion as the bars are multiplied. Further, the two single sash are not alike in parts. Notice the rod A. Observe the difference between the width of the top and bottom rails and their necessary tenons and mortises, each requiring




*Laying-Out Rods.—Fig. 3.—Application of Rod to a Dutch Door.*

two-thirds of the extreme width of rail, the remaining one-third being relish or tusk. The meeting rails differ also. The upper one is rebated on the outside to come flush to receive the glass, and is dovetailed, so as not to pull out, and has the inside wide enough to span the parting strip of the frame. It is beveled toward the top one-half of its thickness. No molding appears on the stiles.

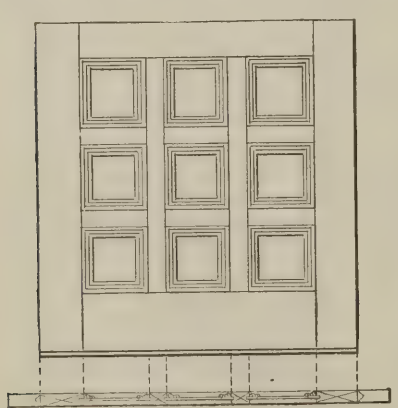


*Fig. 4.—Application of Rod to Upper Section of Door.*

The work is simply cut to abut on its top side. Unlike the upper, the bottom sash has the meeting rail molded on the inside to agree with the molding of the stiles, rails and bars. It is similarly dovetailed and projects with a reverse bevel to the upper, so as to tighten the horizontal joint at X. The rod in this case would also suit one whole sash molded on both edges of the wide cross bars, here shown at B. The cross bars are marked from the rod, rebated, stuck and

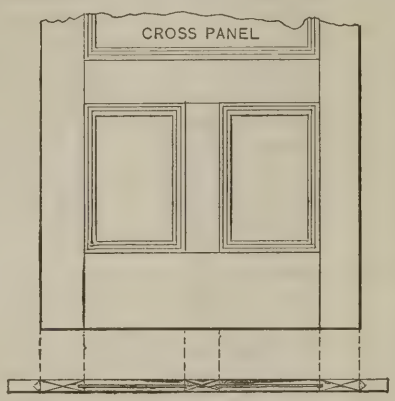



*Fig. 5.—Application of Rod to Lower Section of Door.*

coped to the depth and profile of the prearranged moldings. These are usually O G or ovolo. The upright bars are mortised through to receive the tenons of the cross bars and are coped to the top and bottom rails. Regarding relish, it is to be said that sash also differ in this from doors, inasmuch as the tusk on the door rail fits into the plowing for the panels, as shown in Fig. 1. The square of the sash stile between sticking and rabbet is let into the rail or the whole width of the rail is coped to fit the molding and rabbet combined. B, of Fig. 2, is now, as before, the completed vertical projection of the sash, and C is the horizontal projection.

Referring to Figs. 3, 4 and 5, the value and importance of a full-size dimension rod become still more apparent. Owing to the number and variety of parts in a complex door, such as is shown, it is imperative that a convenient and workmanlike instrument should be at hand during the progress of the work by which to verify measurements and cut out each part or several parts, as the case may be, with certainty and expedition. These sketches are self-explanatory, for the rod is simply a vertical section of the doors, indicating end wood of rails, horizontal joint and all the several parts needed. Exact calculation is extremely necessary in spacing such a door, especially in the upper half, by reason of the ornamental glass in the panels coming to a size (6 inches square), with a ¼-inch smooth margin for inserting a panel mold to hold it in position. The inside stuff must also be of equal width, with a strip of the same thickness as the glass inserted into a plowing to fur out the required width. The best method, therefore, is to measuro the width and hight of three panels in inches and subtract the amount from the total distance between the rails perpendicularly and the stiles transversly. Divide the remainder by two, which is the number of bars required, and the result will be their size. Also deduct from their given size the projection of the strip under the glass.

The necessity of accuracy and definite system is made still more evident by referring to Figs. 6 and 7, where a large space, 19 feet 5 inches, is to be subdivided into a number of lesser and unequal spaces. Perhaps this could be done by measuring with a 2-foot rule upon the quarter-inch drawings, but the uncertainty and danger of the rule slipping must be guarded against, and a full-size rod, actually spaced out with everything shown, becomes a desirable help. By adopting this method errors are avoided.

In Fig. 9 will be seen a conical drum, in which the rod is also effectually used. It shows how every requirement of the shape, including thickness of stuff, rabbet, radius of base and truncate, may be shown upon it. There is also shown in this case how the rod is useful where there is transition from square to curved forms. The usefulness of the rod in forming molds in which to turn the staves and giving them their dimensions and form of taper is also demonstrated. The rod is likewise applicable to all kinds of spiral,

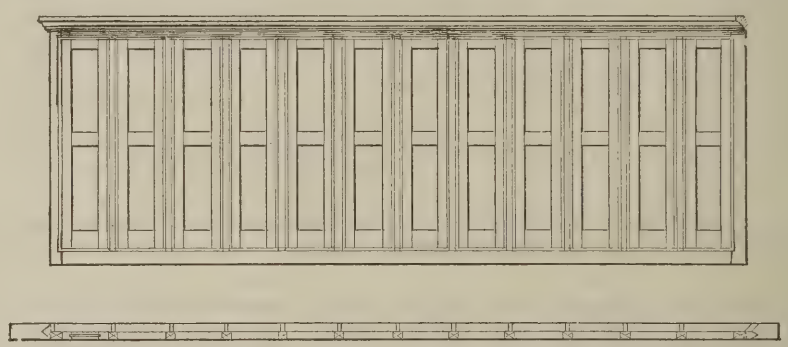


*Fig. 6.—The Rod Applied to Laying Out a Locker.*

elliptical and parabolic shapes, groins, and almost every other conceivable form encountered in building construction. It saves continual measurements from drawings, which, even though they be of large scale, tend to confusion and inaccuracy. Fig. 10 shows a cylinder of the same hight on axis and diameter as the truncate of cone. It is 1 foot 9 inches high and 2 feet in diameter.

Besides the usefulness of a rod for correct work there are other reasons to recommend its employment. Suppose, for example, that a rod with all requirements and dimensions stated on its face is given to a mechanic by his foreman. Suppose, further, that the rod has been laid out by the foreman directly by scale measurements from the architect's drawings; it will at once appear that it acts as a guarantee of each dimension. If any mistake should occur, and mistakes do too frequently occur, would not the foreman be responsible to the architect and the workman responsible to the foreman? However, it is to the superintendent and foreman that these instruments are indispensable. They not only save frequent disputes and constant annoyances, but also serve as a witness to their careful calculations, and act as a guide for the work of those who employ them.

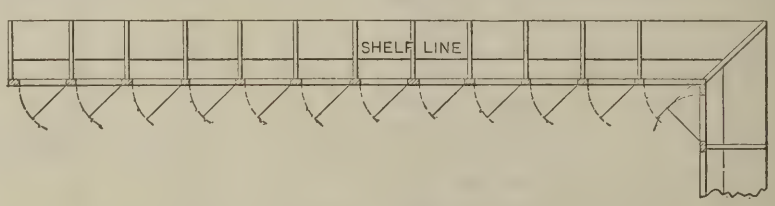
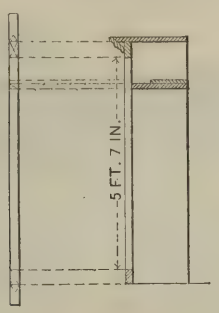



*Fig. 7.—Plan of Locker and Return.*

To workmen who use laying-out rods received from their foreman let me offer words of advice. On receipt of the rod lay it down on the bench before you, or where

you are at work, and while the foreman is still at your elbow repeat the name of each piece, with its dimensions, spacing, form of joint, quality, kind of stuff, design of finish, &c, going into the minutest details and construction of the work Write upon the rod anything that is lacking. Heed not whether the foreman is in a hurry to attend to other business, but be sure before he leaves you that your rod is right and that you know all about the job. Be satisfied fully that vou




*Laying-Out Rods.—Fig.* 8.—*Section of Locker and Use of Rod with Same.*

are safe in going ahead. The time that you will spend in asking questions will be more than compensated by the perfection of your labor. The imaginary fear inspired by some of those in charge of work is only equaled by the awe in which they are held on account of their superior knowledge. This knowledge is claimed to be hardly gained and is often too grudgingly imparted. Confidence in each other and unlimited use of laying-out rods will smooth the way toward the advancement of our craft in quality of work and the acquisition of technical knowledge.

### Ownership of Plans.

*From* G. F. R., *Westerly, R. I.*—I am glad to see that the subject of the ownership of plans and the question of the number and kinds of plans to be furnished by architects have been taken up for discussion. The general subject is one of interest to the trade at large, and at present it is not fully outlined or generally understood. I have read with interest the letter from "S.," of Oneida, N. Y., and also the note by the Editor. I am of the opinion that the plans are the sole property of the architect who made them, and that they are merely his tools in trade by which he shows how he wishes a building constructed. As a parallel case, if I desire a casting made I take the pattern to the foundrymen and by this he makes the work as I wish it. By using my pattern he does not acquire any ownership of it. Another case. If I invent a machine and submit a model to the machinist to make the machine from, he certainly does not acquire an ownership of the model simply because he used it. With regard to the question raised by "T. C. C.," of Washington, I would say that during a long experience as a builder I have always supposed that an architect was expected to furnish any and all plans desired, and plans of any part of a building in process of construction under his supervision and from his drawings. I have never known an architect to refuse me any plan or detail asked for. There can be no question, I think, but that an architect's fees cover the making of all drawings necessary for the proper performance of the work. It is, however, a growing custom among architects, and a deplorable one, too, to shirk as far as possible the making of framing plans and the more simple details. I notice also of late a conspicuous absence of the figures on many plans, thus putting on the builder a large portion of the responsibility for which the architect is paid. These deficiences are not so often observed with the old-line members of the profession as with the fresher ones. This statement of the present condition of affairs naturally brings up the question of who is to blame in case of an error. If the builder follows the plans as nearly as he can scale them in the absence of figures, and then it is found that the work is wrong, whose fault is it? The answer to the last question is readily supplied. Of course the responsibility rests with the architect. True, but in either case who pays for it? Certainly the brunt of the mistake should not be borne by the builder, because he followed either the plans or the figures, as the case may be. Certainly the expense should not fall upon the owner, because he pays the architect to do the work correctly. Then who should pay for it except the architect himself. On the other hand, how many architects are there who ever correct their own mistakes or bear the expense of their blunders? It almost always falls upon the builder, who in most cases finds plenty of little things of this character which he did not count on in making his estimate. My experience has been varied. I find that most architects will have the expense of such changes or corrections charged to the owner as an extra in case they cannot make the builder stand the expense. The owner, not knowing the custom in such matters, and not being fully posted, allows the matter to be adjusted in this way. In a very few cases I have known the architect to pay the expense himself, but such cases are rare. I would like to see an exchange of opinion among contractors and builders, and a full discussion of the "Relation of Architect to the Builder." The question is one that will bear discussion, and the results cannot fail to be of value to builders in general. Perhaps the discussion might be valuable to the architectural profession also.

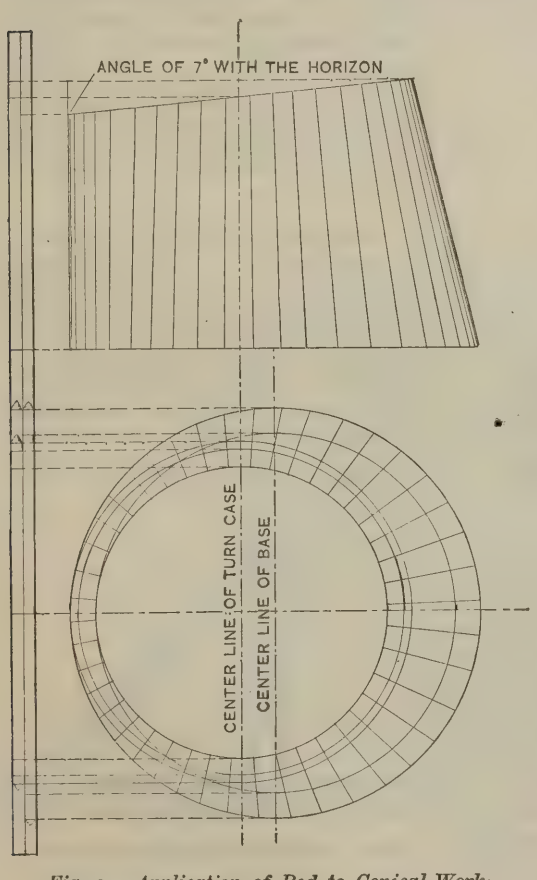



*Fig.* 9.—*Application of Rod to Conical Work.*

*From* S. B. B., *Appleton, Wis.*—In reply to the communication from "S," published in page 15 of the January number, I would say, that if A furnishes plans, or superintend the work of erecting a building, the plans are his tools to work with. The owners of the building are no more entitled to them on completion of the job than they would be to the tools of the mechanic who works on the building. If, on the other hand, the owner should say to the architect, "What will you charge me for plans for my building; my carpenter is capable of constructing it; I shall not need you to oversee the work?" the architect would be selling his tools,—or, in other words, his knowledge—for a certain sum, and in that case the plans would belong to the owner.

*Note.*—Our correspondent has a very plausible way of presenting the subject on which he writes. We do not see, however, that it follows because an architect does not superintend the building he necessarily sells his plans outright. Continuing the same

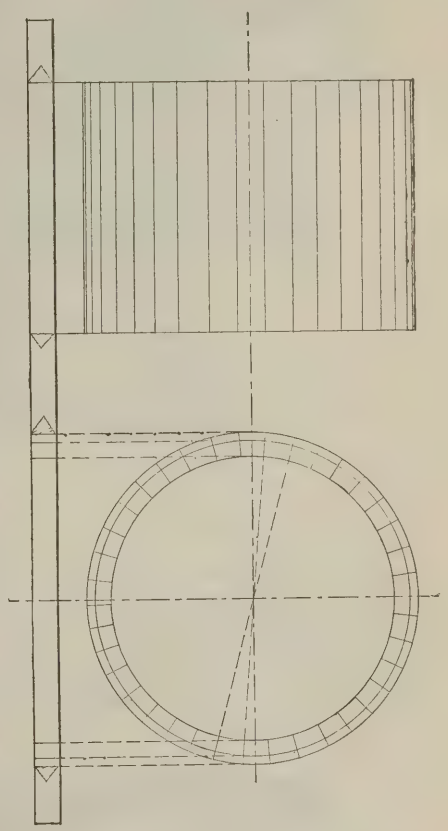


*Fig.* 10.—*Application of Rod to Cylindrical Work.*

figure of speech, why does he not in the second instance rent out his tools without his own personal use of those tools; This is a question which perhaps "S. B. B." will be disposed to answer at some future time.

### Boxwood.

*From* G. B., *Dayton, Ohio.*—Not every reader of *Carpentry and Building* is aware that boxwood grows in the regions of the Caspian and the Black seas. In certain portions of that section of the world the greater part of the people are employed in the industry of cutting this wood and shipping it to foreign ports. The finest qualities of boxwood have a delicate yellow color, clear and free from spots. It cuts smooth and even. Besides being used for the scales and rules with which every reader of this journal is familiar, it is used for fine engravings. Of our native woods maple and pear are the best substitutes for boxwood. Mahogany is sometimes employed as a substitute. Boxwood weighs about 75 pounds to the cubic foot.

### Kerfing.

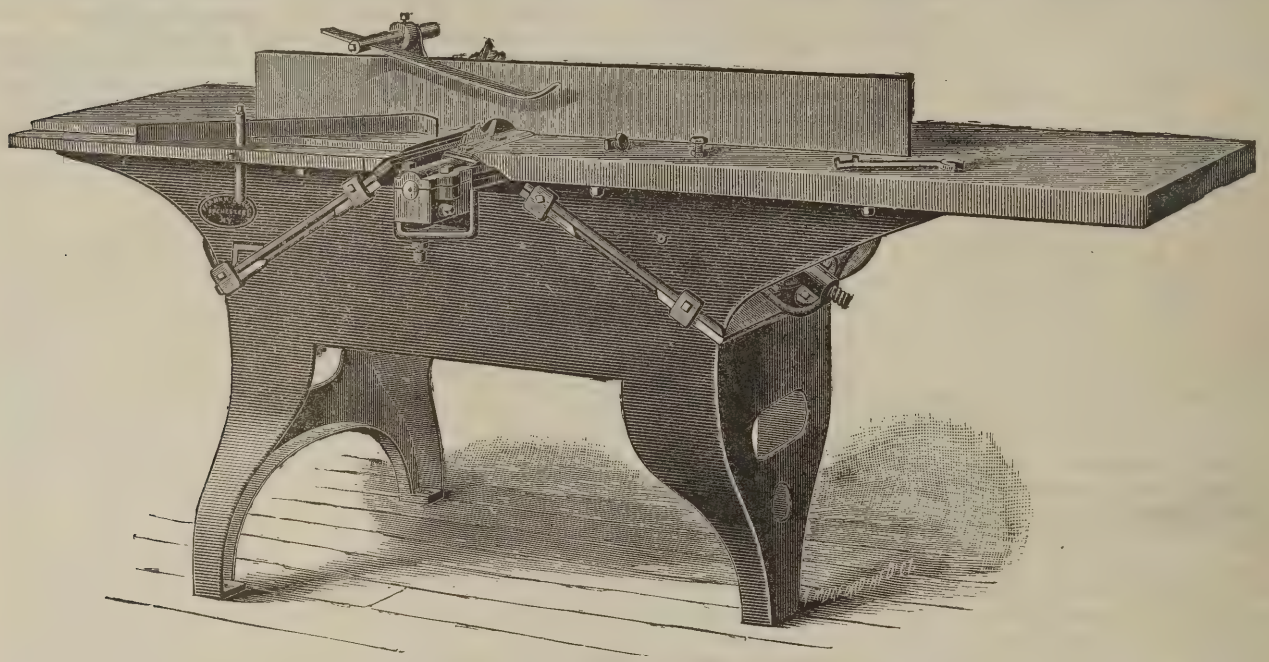
*From* C. F. L., *Clarksville, Tenn.*—I would like to see published in *Carpentry and Building* a plan for getting the distance between saw kerfs in the process of bending a piece of stuff around a circle.

*Answer.*—We have published rules for kerfing at different times, one of which will be found on page 17 of the January issue for 1880. The principle there explained is that upon which various modifications of the method depend.

# NOVELTIES.

### New Buzz Planer and Molder.

The machine illustrated in Fig. 1 of the engravings is called by the maker, Frank H. Clement, Rochester, N. Y., the Perfection Buzz Planer and Molder. It is said to be an entirely new tool, and to have features which are of interest to those who employ machinery of its general class. It is a buzz planer, jointer and molder combined. The frame, as will be seen by the engraving, is cast in a single piece. It stands on three legs, and on this account the boxes are not liable to be strained out of line. The tables are elevated on continuous slides which are perfectly rigid under all circumstances. The maker asserts that it is impossible to get the tables out of line. The boxes are cast in a separate yoke, and are adjustable vertically by set-screws, so as to be kept in line with the table surface. The cutter-heads are steel forgings made in the most careful manner, well balanced; will run cool and tight at the first starting. The boxes are self-oiling, and provision is made for cleaning the reservoir. Both sections of the table have horizontal adjustment to and from the cutter-head, independent of the inclined ways. The gauge is adjustable to 45° and to any point between that and a right angle. The engraving also represents a special molding attachment which is particularly valuable to carpenters and also in jobbing shops, planing mills and furniture factories. The cutter-head is slotted on the sides not occupied by the plain knives, and molding, beading, tonguing and grooving as well as other special knives can be attached without removing the plain knives. It is thus possible to do a great variety of special work which is often necessary in preparing the inside finish of buildings. The special features of this machine are the subject of a patent recently issued.



*Novelties.—Fig. 1.—New Buzz Planer and Molder, Built by Frank H. Clement, Rochester, N. Y.*

### Walker's Detachable Handled Chisels and Gouges.

The E. Walker Tool Company, Erie, Pa., are putting on the market detachable handled chisels and gouges, the special features of which are illustrated in Fig. 2, which also shows the style in which these goods are made. The handles, as indicated, are detachable, and are described as quickly and easily adjusted, being interchangeable. Where the shank fits in the handle a piece of dried rawhide is inserted to receive the stroke and prevent upsetting either of the handle or shank. In referring to this contrivance and its convenience the manufacturers state that only two handles are necessary for the full set of chisels, ranging from ⅛ to 2 inches, one handle for firmer chisels, which is referred to as standing all that an ordinary handle will, and the bent handle for paring chisels, the convenience of which for wood-workers is especially alluded to. The blades are described as drop-forged of the best quality steel and carefully tempered. The shanks of blades and the sockets in the handles are finished to a standard gauge, so that in ordering extra blades at any time they will be sure to fit. These tools are put up, as indicated in the illustration, in a neat case 14 x 2½ x 8 inches, thus giving, it is pointed out, a package light and convenient, in which the tools are always in place and out of the reach of dust and dampness. The company also make a set of gouges to be used on the same handles. A set of gouges comprises 18 bits, of which 12 are sharps and mediums and range from ⅛ to 2 inches. Six are flats and range from ½ to 2 inches, which are referred to as cutting all sizes from ⅛ inch circular to 20 inches circular. The latter set, including handles, blades and case, is stated to weigh about 8 pounds, and is alluded to as meeting all the requirements of the class of work for which it is designed, occupying but small space on the bench or in the chest and keeping the tools in the best condition. The handles are made of second-growth white hickory, and the sockets are nickel-plated.

*Fig. 2.—Detachable Handled Chisels and Gouges.*

### Combined Square and Miter.

Hatch Bros. & Co., of Bridgeport, Conn., are offering the trade a combined square and miter, an illustration of which is presented in Fig. 3 of the engravings. The tool measures some 10 inches in length on the long arm. The connection between the two arms is cast somewhat thicker than the blades, so as to form a head, thus adapting the tool for use in scribing, and also makes it very convenient for drafting purposes. The head is cored out, so as to lighten it without diminishing its strength. There is no adjustment required, nothing to get out of order, and it is always ready for use. The construction is of a character to preclude the danger of injury from falling which frequently occurs to tools of its general class. The blades are of steel, well

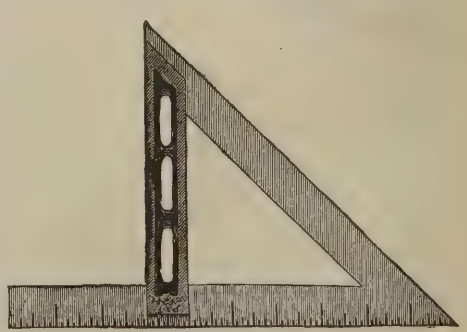
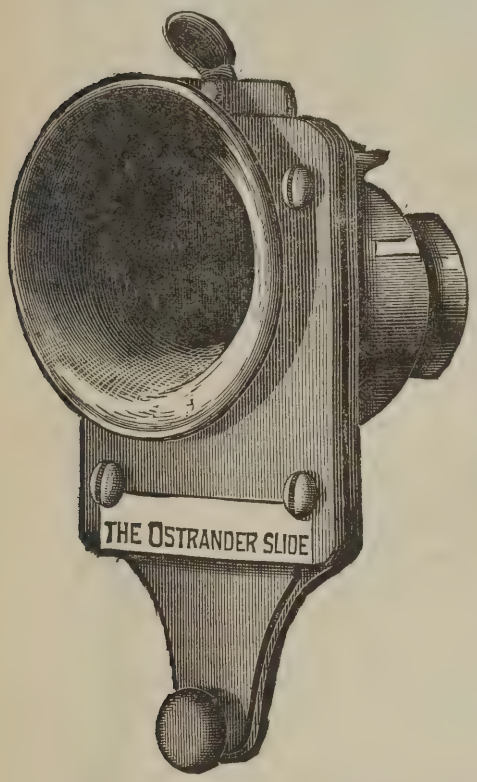


*Fig. 3.—Combined Square and Miter.*

finished, and the entire tool is nickel-plated. Graduation on the horizontal blade is to eighths of an inch. The entire length of the handle comes next to the work, thus insuring perfect work.

### Slide Speaking-Tube Mouth-Piece.

The speaking-tube mouth-piece illustrated in Fig. 4 has recently been brought out by W. R. Ostrander & Co., 21 and 23 Ann




*Novelties.—Fig. 4.—Slide Speaking-Tube Mouth-Piece.*

street, New York. The peculiarity of this mouth-piece is that it is without springs, the tube being opened by raising a slide which, when released, falls of its own weight and closes the tube. The indicator when raised falls over the top of the slide, so that when the latter is pushed up it throws it back in position for the next call. The slide has a small knob at the bottom by which it is easily raised. The wear of the slide is easily taken up without removing the body of the mouth-piece, as the front plate unscrews and is not riveted. The mouth-piece is stationery and the sound is sent direct into the speaking-tube without interruption. All the parts are of heavy brass and are finished with plain polished surface or nickel-plate, as required. The mouth-pieces are also manufactured without the whistle alarm and used as a closed mouth-piece in connection with electric-bell systems.

### Adjustable Stay Roller.

Fig. 6 represents a hinged adjustable stay roller, which is manufactured by the Medina Mfg. Company, Medina, N. Y., and is the invention of Albert L. Swett, of that company. It will be perceived that this article is made with a hinge under the roller, permitting its ready adjustment to any thickness of door by opening or closing the hinge. Attention is called to the fact that the ends of the strap are bent outward in opposite directions, and when fastened to the building that they are very strong and durable. The great advantage which this stay roller has over the old style is stated to be that it cannot become loose and turn over when in use.

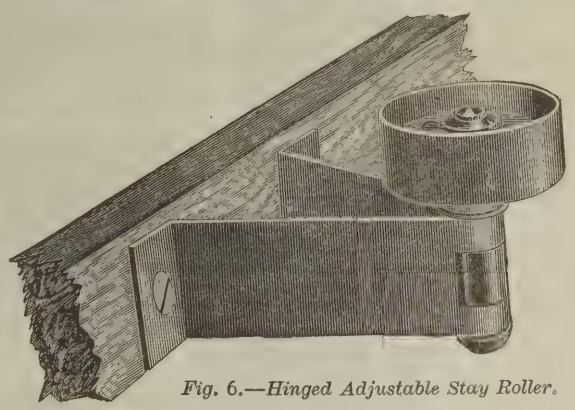


*Fig. 6.—Hinged Adjustable Stay Roller.*

### A New Planer and Matcher.

The Cordesman Machine Company, of Cincinnati, Ohio, are turning out a new combined planing and matching machine, of which we present an engraving. The machine is especially adapted to use in job shops and planing mills. It will surface, tongue and groove, or joint and rabbet, or when desired the cylinder may be arranged so that flat molding, beading, siding and all other similar work can be made to advantage. The machine has ample capacity for all ordinary work, and it will commend itself to wood-workers. The frame, with cylinder and roller-boxes, with the large floor support, is cored out and cast in one piece. Any one familiar with wood-working machinery will know that a casting of this description is best adapted for strength and strain; it also prevents the possibility of getting out of shape in shipping and if not carefully leveled on the floor. As will be seen from the engraving, the bed is of extra length, and is also cast in one heavy and well-braced piece. It is constructed in such a manner as to produce work that is perfectly smooth and true. The bearings on the side of table into which the frame is fitted are four in number, two on each side, and all are 14 inches long. They are provided with inclined jibs, which are fastened by bolts. Should there be any lost motion in the table at any time the operator can, by simply screwing up the bolts, take up all such wear. Owing to the accurate fitting of the table into the frame, it is almost impossible for the latter to become shaky by the action of the feed rolls and from the weight and jar of lumber thrown upon it while the machine is in motion. The table is raised and lowered by means of a vertical shaft, with a crank placed at the top, in close reach of the operator, and by means of it and the index, which is conveniently placed on the side of the machine, it can be adjusted to suit any thickness of lumber up to 7 inches. The cylinder, with journals, is made of a solid cast-steel forging; it is truly fitted and accurately balanced, and is driven by two belts. The cylinder boxes are very large and long, and are self-oiling. Two adjusting pressure bars (one on each side of the cylinder) are placed very near the cut, and will yield to the inequalities in the surface of the lumber, and pieces 6 inches or less in length can be planed with accuracy. The two matcher spindles are ground true and are accurately balanced. They revolve in long cap boxes lined with Babbitt metal. The caps have large oil-cups cast in them. Both upper and lower spindle boxes are connected by a web, and are jibbed to two truly-turned horizontal guide-bars which are securely fastened to the inside of the table. These matcher spindles are so arranged that the wear and strain of the belts are not on the cap side of boxes, and they are therefore held stiffly up to the work before them. These matcher heads are made of composition metal, and, of course, are turned perfectly and balanced, and are supplied with solid milled matcher bits made of the best tool steel. A very simple and effective chip breaker is fitted to the machine, and by means of it the slivering and breaking out of lumber is prevented.

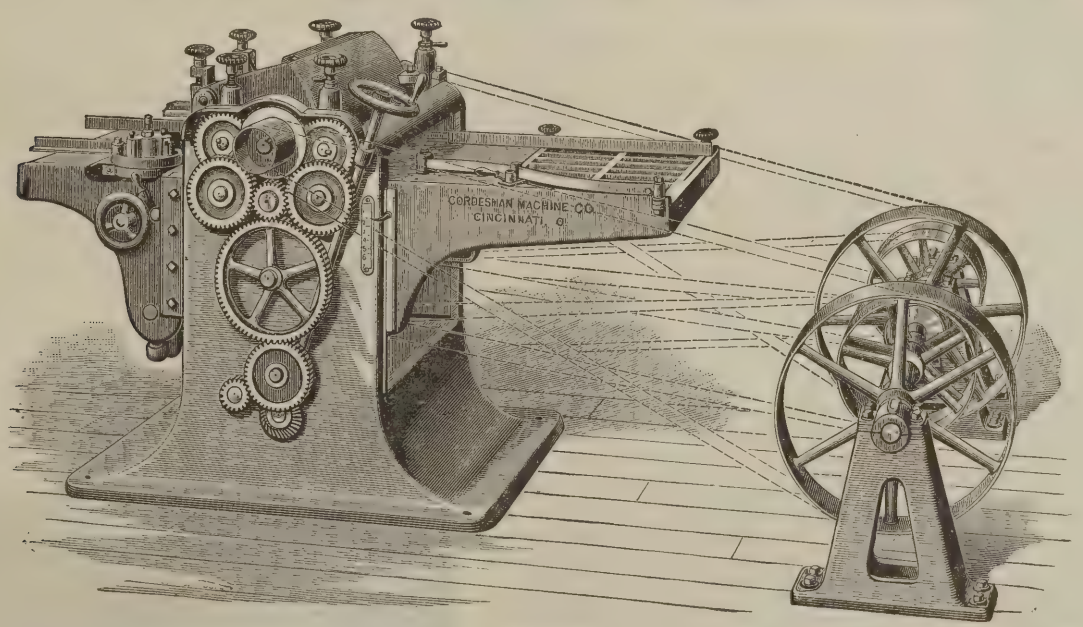
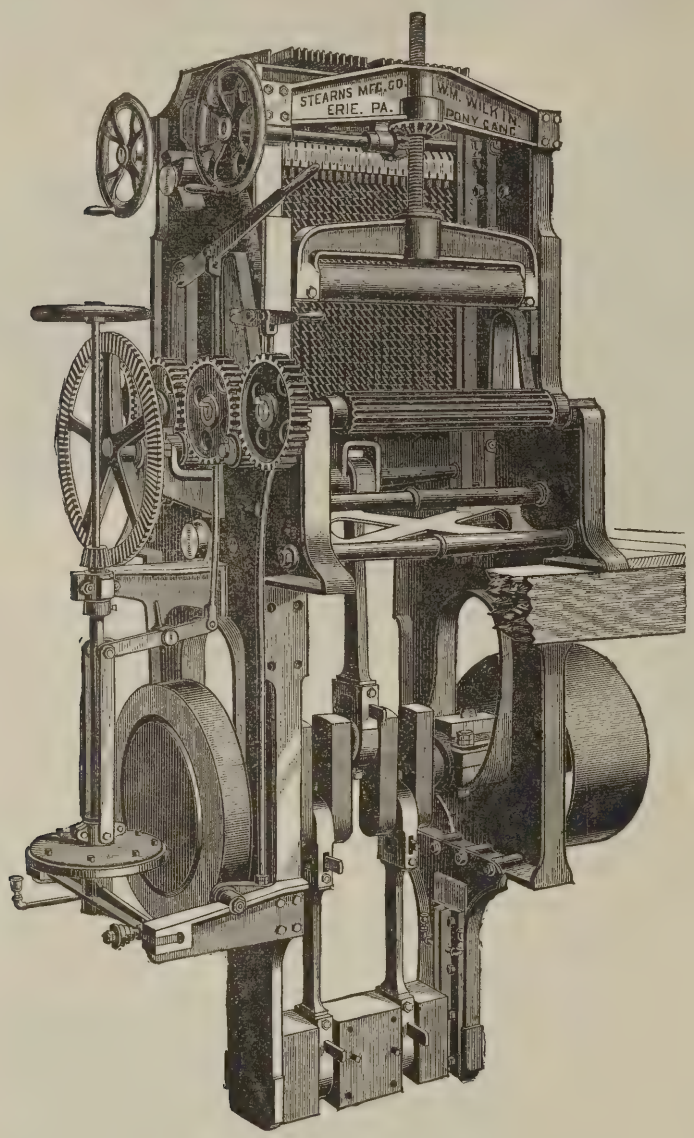



*Fig. 5.—Combined Planing and Matching Machine, Built by the Cordesman Machine Company, Cincinnati, Ohio.*

The adjustments of the matcher heads are perfect. They move up and down with the table, or can be adjusted so as to receive different width boards by means of the hand-wheels on the side of the machine.




*Novelties.—Fig. 7.—Compensating Gang Saw Mill, Built by the Stearns Mfg. Co., Erie, Pa.*

To make changes for planing the full width of the machine, the fence, chip breaker and matcher heads can be taken entirely out of the way in a moment's time. The two upper feed rolls, of forged steel, are 3 inches in diameter. These rolls are driven with a special compound yielding gear, and will permit the rollers to rise to such an extent as to take a ½ or ¾ inch cut without becoming disconnected. The rollers are given pressure by steel coiled springs placed at the top of the machine, and controlled by means of hand-wheels which are in close reach of the operator. The two lower adjustable feed rolls are 4 inches in diameter, and made of cast iron, fitted with steel shafts. The feed gear is independent, and so arranged as not to interfere with the cylinder pulley, and will give a strong and steady feed. The countershaft is 1⅞ inches in diameter, and has three hangers. These hangers are designed specially for the machine, and are made in box form with an extra large floor support. They are cored out and cast solid. The boxes are lined with the best metal, and have caps to take up the wear. The machine is made also with both upper and lower feed rolls driven by power. The 26-inch planer built by the Cordesman Machine Company is precisely the same in design as this machine, excepting that the table is not quite so long, nor has it the matcher attachment.

### Wilkin Compensating Gang Saw Mill.

We show in the accompanying cut the principles and construction of the Wilkin Compensating Gang Saw Mill, built by the Stearns Mfg. Company, of Erie, Pa. While the reciprocating saw is the oldest form of machine for making lumber, it remains to this day the cheapest and most economical one for the purpose. Improvements are, however, constantly being made in the methods of use, further increasing its capacity and economy. The radical departure in this machine from previous practice consists in the adoption of a device for preventing excessive vibrations. The immense weight of a heavy sash full of saws, reciprocating at high speed, requires, in the old form of machine, enormous weights in the shaft and crank-pin, and an absolutely stable foundation below the pillow blocks. The Wilkin compensating gang is provided with three cranks, two of which are opposite the third, which is in the center operating the pitman and sash. Pitmans attach the outside cranks to a counterweight below, exactly equal to the weight of the sash and its saws. The two lower rods are of the same weight as the upper, and all the cranks are of the same throw. It will be apparent that, the motions of the sash being in exactly opposite directions to the motions of the counterweight, the opposing shocks and vibrations will thoroughly neutralize each other and the machine will run without jar. The shaft and boxes have but to carry the weight of the sash, rods and counterweight, and transmit the power necessary to do the work. The kick of the rods being directly opposite also neutralize each other. By thus depriving the gang of its power to injure itself or the foundation, high speeds become possible, while the cut per stroke is maintained. In this gang the sash is of one casting of steel. It is oscillated near the top by means of an eccentric-rod and rock-shaft so timed with reference to the stroke that the saws enter the cut without shock, leave it when the stroke is complete and rise clear of the log, being again thrown into action near the top of the down stroke. The feed is continuous and variable at the will of the operator. In the machine shown the rolls open high enough to take in a 14-inch cant (flatted log), 32 inches wide, or the rolls may be filled up with several smaller "cants" or "flitches" piled in tiers, so that flooring may be rapidly made. The ordinary feed carried is ¼ inch per revolution of shaft, and the number of revolutions per minute is 300. The saws are held by tabs and buckles keyed at the top. They may be placed any distance apart for making lumber of any desired thickness by the insertion of gauge blocks between the buckles. The machine requires but one attendant, and its capacity is about 40,000 feet of inch boards or flooring per day.

### Adjustable Countersink.

Fig. 9 of the engravings represents a new countersink for wood screws and other purposes which has recently been put upon the market by Otis A. Smith, of Rockfall, Conn. The countersink consists of two pieces joined together by screws and made adjustable so as to fit around the shank of any bit up to ⅜ inch in diameter. One of the two pieces of which it consists is a gauge-plate, and this is arranged to move up or down by means of slotted holes through which the screws pass, thus adapting the conical cutter, which is a feature of the other piece, to cut more or less, as may be required. The article does its work very efficiently, and can be instantly adjusted to fit any size screw-head that may be required. The usefulness of such a tool where hardwood finish is to be put in place will be readily appreciated by our readers.

*Fig. 9.—Adjustable Countersink.*

### Southwick's Patent Floor Clamp.

Fig. 8 illustrates Southwick's Patent Floor Clamp, which is being offered to the trade by Southwick & Alexander, Brockton, Mass. The device is used for laying floors and doing general clamping. The cross-piece which presses against the flooring is grooved, so as to receive the tongue of the board, and is cut away at the upper side, so that in blind nailing the nail can be driven while the clamp is in posi-

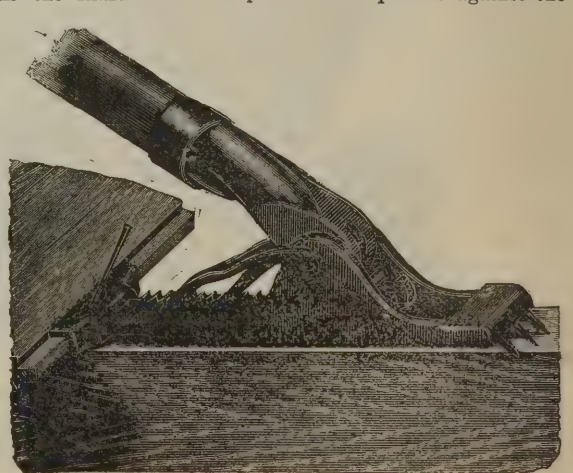


*Fig. 8.—Southwick's Patent Floor Clamp.*

tion, as is shown in the illustration. The cross-bar is pivoted at the center, which allows a certain play. By this means the pressure is brought at right angles against the flooring board without necessitating a careful adjustment of the clamp. The pressure is transmitted to the cross-bar by means of a ratchet in which two pawls engage, one of which is fastened to the stationary part of the clamp, while the other is connected with the lever arm a short distance above its bearing. The ratchet is separate from the framework of the clamp, and moves in a groove provided for it. At the back of the clamp are spurs, or spikes which anchor the clamp in position. In operating the clamp the ratchet is first slid within the framework and the cross-bar brought against the flooring board. The handle is then pressed forward, while one foot is placed upon the rear ot the clamp to force the spurs into the joist. In pushing the handle forward the pawl attached to it engages with the ratchet and brings a very heavy pressure to bear upon the board. Especial reference is made to the fact that the clamp does not operate until the lever arm passes the vertical and approaches the position shown in the cut, for, owing to this construction, a very heavy pressure can be exerted, as the whole weight of the body can be thrown on the lever arm to force it down and push the flooring board in place. The clamp is made of malleable iron and steel, and occupies a space of 12 x 4 inches, so that a carpenter can easily find room for a pair of them in his tool-chest. The manufacturers state that a pressure of 2000 pounds is easily obtained with a 16-inch lever arm.

## NEW PUBLICATIONS.

STEAM-HEATING PROBLEMS. From the *Sanitary Engineer*. Size 9 x 6 inches 233 pages. Published by the *Sanitary Engineer*, 1886. Price, $3.

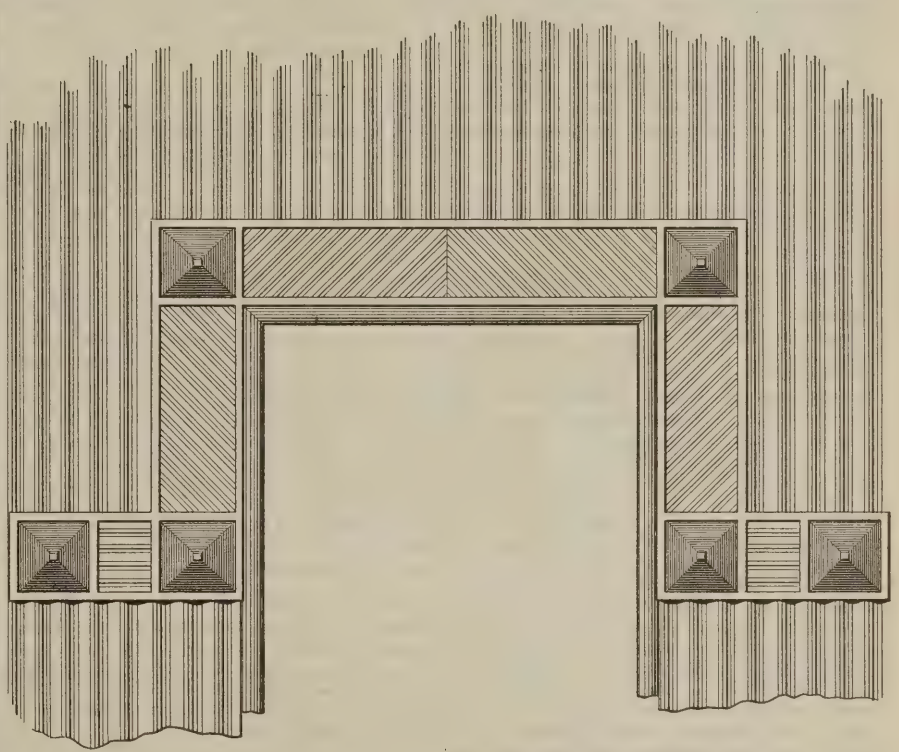
The book before us is a companion volume to "Plumbing and House Drainage Problems," also compiled from the pages of the *Sanitary Engineer* and which was published last year. The title indicates the contents of the book, which comprise a series of questions, answers and descriptions relating to steam heating and steam fitting. The *Sanitary Engineer* is a carefully edited paper, and the excerpts from its correspondence columns, together with a number of descriptive articles systematically arranged and fully indexed, constitute an excellent and reliable reference book on the subjects treated. We give below a summary of the table of contents, from which the scope and bearing of the work may be judged: Boilers; Value of Heating Surfaces; Radiators and Heaters; Piping and Fitting; Ventilation; Steam; Cutting Nipples and Bending Pipes; Raising Water Automatically; Moisture on Walls, &c.; Miscellaneous. Under each of these divisions a variety of special cases is treated of, through which means of specific illustration the general principles of construction and arrangement are taught. In all cases where advisable the text is further elucidated by the aid of cuts, which assist very materially in rendering the treatment of the subject clear and intelligent. Interesting descriptions are given of the arrangement of the heating apparatus in a number of large buildings in this city and elsewhere, and the ventilation of buildings is also illustrated by examples drawn from this and foreign countries. The miscellaneous paragraphs with which the volume closes all relate in a more or less general way to the subject of heating, and make a good ending to a book which the steam fitter and heating engineer will find both interesting and valuable.

TABLES FOR CALCULATING THE CUBIC CONTENTS OF EXCAVATIONS AND EMBANKMENTS. By John R. Hudson, C. E. Size 5¾ x 9⅛ inches, 79 pages. Published by John Wiley & Sons. Price, $1.

The second edition of Hudson's tables, which was issued a short time ago, has been considerably enlarged. The tables, as the title indicates, are designed for calculating the cubic contents of excavations and embankments by an improved method of diagonals and side triangles, and will be found useful in many respects. Irregular cross-sections can be rapidly worked out by using the tables of side triangles, and, as nearly all the work is done by these, and they have been calculated with great care, the chance of error is greatly reduced.

## Corrugated-Iron Finish.

Most of the corrugated-iron work that is put up in this country is rushed through without much regard for architectural finish or stylish appearance. Corrugated iron is largely employed because it is cheap, and very little effort so far has been made to obtain from it the architectural effects of which it is capable. Occasionally, however, there is encountered among the manufacturers of corrugated iron men who give some attention to the artistic side of their work and make attempts toward that display which gives their work a distinctive quality in the eyes of the general community. We have often thought that manufacturers of corrugated iron neglected their opportunities in matters of this kind and that they might make their work much more popular than it is at present if they took more care in matters of this sort. The



*Method of Finishing Windows in Buildings Sheeted with Corrugated Iron.*

accompanying illustration represents the way that some windows were recently finished in a job of corrugated-iron work done by the Cincinnati Corrugating Company. The siding shown has corrugations 2½ inches between centers. The main portions of the cap are made of corrugated iron measuring 1¼ inches between centers. The diamond-shaped pieces shown at the angles, of which six are employed in the design, are made of corrugated iron measuring $\frac{5}{16}$ inch between centers. These are mitered in a way to project ¾ inch from the body of the cap at centers of the diamend. The joint between the siding and the edges of the cap is covered by a strip of metal in a way to make the work water-tight and at the same time impart to it an appearance of finish.

## The Relation of Mechanics to Architecture.

The different styles of architecture, says Professor Rankine, may to a certain extent be distinguished and classed according to the kind and the greater or less complexity of the principles which regulate the stability of the structure. The simplest kind of stability is that of a single mass resting on a base; this is exemplified by pyramids, obelisks and solitary pillars. Next in point of simplicity is the stability of a load resting on a lintel whose two ends are supported by pillars each of sufficient dimensions to be stable in itself. This we find exemplified in Egyptian and Greek architecture, and in those examples of Roman architecture from which the arch and dome are absent. The next degree of complexity consists in supporting the load on each pier of which the structure consists by a pair of pressures inclined to each other—that is, by introducing the arch and dome; and this we see in later examples of Roman and Italian architecture and in various styles of the earlier Middle Ages, such as the Byzantine, the Lombard and the Anglo-Norman. The perfecting and extending the application of the arch so as to sustain the entire load of the higher parts of the structure by means of the thrust exerted through ribs, suitably formed and arranged, characterizes Gothic architecure. The balancing of overhanging leads is seen to a certain extent in the beetling bartizans and turrets which form the most picturesque feature of the Scottish baronial style. The balancing of bulky arches upon comparatively slender pillars, whose lateral stability depends very much on their connection with the mass above them, is characteristic of Saracenic architecture. The styles of framework in roofs and in buildings of wood and iron might be classed in a similar manner, according to the way in which the principles of statics regulate the stability of the structure. Another mechanical characteristic of styles in architecture is the way in which the strength of the materials is exerted. In the obelisk, pyramid and simple tower or column, resistance to crushing is also brought into play, and the same is the case with the most elaborate combinations of ribs, groined arches and tracery in gothic architecture. In the styles which employ architraves supported by pillars, the transverse strength of lintels or beams is also employed. The support of overhanging loads requires the transverse strength of corbels and cantilevers, and in some cases the tenacity of cement and cramps. Timber and iron framework bring every form of strength into requisition. A subordinate distinction of styles, founded also on mechanical principles, depends on the hardness and durability of the material of the building. For example, a certain plainness of style, which if executed in granite constitutes majestic simplicity, appears poor and bare in sandstone, and paltry in brick.

# TRADE NOTES

WE HAVE RECEIVED from R. T. White, No 148 High street, Boston, a circular descriptive of his patent Universal woodworker, in which engravings are presented showing corner blocks and fancy panels which illustrate the work which this machine will produce. As to capacity, the statement is made that the machine will turn out from 2500 to 3000 corner blocks per day. It is said also that it will house stair strings as fast as 10 men can do them by hand. At the same time it will make the dovetail and nosing finished and ready for keying up steps and risers, and will dovetail steps for balusters. Still other interesting statements are made concerning the utility and capacity of this machine.

A NEW CATALOGUE of wood-working machinery has been issued by Dietz, Will & Co., 58 and 60 Plum street, Cincinnati. This firm occupies a factory which has been constructed with great care to secure all the facilities known in the manufacture of machinery. The members of the firm are practical mechanics, and the machinery produced is already known to a large number of our readers. Among the tools shown in this catalogue may be mentioned pony planers, planers and matchers, furniture planers, hand planers or jointers, cross-cut saws, band saws, scroll saws, a Universal saw bench, a friezing, edge molding or shaping machine, &c.

WE HAVE RECEIVED from I. P. Hicks, Atlantic, Iowa, a pamphlet entitled "Blanks for Estimating Material and Labor." The book seems to be composed of a number of duplicate sheets bound together. At the top of each sheet is a table, entitled "Ready Reckoner—Scantling Measure." Down the column at the left is a list of "Materials," such as sills, posts, main girts, first, second and ceiling joists, side studding, &c., the list comprising about all the timber that may be supposed to enter into the construction of a house. The column on the blank next these items is entitled "Quantities," another is called "Size and Style," a third "Specifications," and the outside column "Cost." A special effort has been made to economize paper, and the list of items referred to is printed in "small caps," solid, while the ruling opposite does not correspond with the items. Were any job to require all the items filled out, or even alternate items, it would be necessary to write in a much smaller hand than is ordinarily effected by builders. On the opposite side of the sheet is a continuation of the same form, with items omitted, being intended evidently for miscellaneous material not included in the previous list. There is also a table for estimating labor. The plan pursued by this author, as explained on the inside of the cover, is to estimate labor by the square. A list of prices is presented which he has calculated on the basis of $2.50 per day. Variations are made by adding to or subtracting. The general scheme is one which will no doubt interest many builders, and on this account it is unfortunate that the mechanical features of the blanks have been so slovenly attended to. The ruling on the back of the pages has been set up, and there is lack of justification throughout, as well as many important omissions.

WE ARE IN RECEIPT of a circular issued by Alex. A. Arthur, of Knoxville, Tenn., descriptive of the timber and mineral resources of the South, and more particularly of Tennessee. The circular contains many interesting particulars concerning the kinds of timber found in the South and the advantages of Knoxville as a timber market. Reference is also made to the fact that English capitalists as well as capitalists from the northern portion of the country have already made heavy investments in this region.

FROM PALLISER, PALLISER & CO., 24 East Forty-second street, New York, we have received a copy of their new specification for frame and brick buildings, costing from $1500 to 10,000. In this specification the different trades are recognized as follows: Mason, carpenter and joiner, painter, slater, tinner, plumber and gas-piper. This specification differs from others which have preceded it issued by the same firm in the care with which it has been prepared and in various minor modifications which long practice has suggested. We understand from the publishers that this specification represents the best results of their extensive experience, and is the form that they are using in their regular work.

THE AJAX MFG. COMPANY, of Pittsburgh, Pa., are directing attention to the Ajax wood-boring machine, an illustration of which appeared among our "Novelties" in our issue for May, 1884. A special feature of the machine is that any kind of an auger can be used, whether having a long or short shank. A hand-auger with the handle off can be used as well as any other in this machine. The auger is centered and held by a chuck, so that, no matter what size the auger is or what the length of shank, so long as it can be introduced, the chuck will hold it. The machine is provided with several adjustments. By one of these it can be set to bore any depth of hole; reversing gear is provided so that when it is reached it withdraws quickly without change of motion. By another adjustment the auger can be set to bore at an angle

THE ANNUAL convention of the Brotherhood of Carpenters and Joiners, which was held in Buffalo early in August, is reported to have been a very successful meeting. Delegates were present from over 200 local unions, representing some 40,000 members. The report of the committee, which conferred with the Knights of Labor at their general assembly at Cleveland some time since with reference to establishing amicable relations with that order, was presented and was adopted as read. From this we infer that the two organizations have agreed to recognize each other. It is stated that they will act jointly in adjusting wages and in managing other affairs. The membership of the order has quadrupled in the last two years, which has necessitated a general revision of the constitution. The headquarters of the Brotherhood have been removed from Columbus to Philadelphia. W. J. Shields, of Boston, was elected president, and P. J. McGuire, of Cleveland, was re-elected secretary.

IN ANOTHER PART of this issue W. C. Scott, of No. 204 Clinton street, Cincinnati, directs attention to Scott's end-wood and miter plane. Among the special advantages mentioned are that this plane will not jump or chatter on end wood, and that it is simple, durable and effective.

MORTON'S SASH CHAINS as substitutes for sash cord have long been before the public and are well known to our readers. In his card in another part of this issue the manufacturer presents several testimonials relating to these goods, and calls attention to late improved attachments.

WE HAVE RECEIVED from F. W. Thaxter, Diana, Dak., copies of "Thaxter's Condensed Lumber Statement and Calculator." This form is in tended to form a part of a billhead for lumber dealers or for estimates made in the interest of contractors and builders. The printed head at the top of the blank is made to suit the circumstances under which it is to be used. The size of the sheet is something above foolscap. Space somthing less than one-half the sheet in depth and two-thirds in width is devoted to a table giving the board measure of different sizes of lumber of different lengths, and leaving spaces for the insertion of the number of pieces. At the right of this is a column for the number of pieces, another for the total surface feet, a third for cost per thousand, and a fourth for total cost. The lower half of the sheet is ruled in a corresponding manner for different kinds of lumber. There are added also glazed and unglazed windows, doors and blinds. From this very brief and inadequate description it will be seen that the blanks are very convenient for all transactions with lumber. The sheet is in effect a ready calculator applied to a billhead or estimate blank. Accordingly it is of special interest to builders.

THE ORMSBY SASH HOLDER COMPANY, with offices No. 93 Utica street, Boston, and Tribune Building, New York City, invite the trade to send for full description and prices of their substitute for sash weights. We have already illustrated this article in our department of "Novelties."

THE BARNES TOOL COMPANY, of New Haven, Conn., announce that over 600 of their self-feeding hand sawing machines are at present in use. They also mention that this machine received the highest prize at the New Orleans Exhibition. The machine is especially recommended for woodworking establishments which are run without power.

J. E. BOLLES & CO., of Detroit, Mich., are inviting the trade to send for their new illustrated catalogue of roof crestings, iron balcony columns, lintels, railings, fencing, wirework and general ironwork.

THE NATIONAL SHEET METAL ROOFING COMPANY, No. 510 East Twentieth street, New York, inform us that they have been awarded the contract for covering the prison and House of Correction, New Bedford, Mass., a job which requires over 220 squares of roofing. The Walters shingle, 10 x 14 in size, made of 12-ounce cold-rolled Lake Superior copper, is to be employed. We understand that the company secured this contract at a price equal to $6 per square more than what the usual style copper roof could have been furnished for.

A CIRCULAR issued by James B. Scott & Co., Pittsburgh, contains a *fac-simile* of the impression stamped upon each sheet of Scott's extra-coated roofing plate. The gauge mark is in the center of the brand. The outside line of the lettering contains the name and address of the firm, while inside of it, and yet surrounding the gauge designation, is "Extra Coated, Hand Dipped." This phraseology is an agreeable variation from the changes which have been rung on terms that are somewhat synonomous with "old-fashioned." The brand or stamp is in the form of an oval, about 2 x 3 inches in size.

THE SAGENDORPH IRON ROOFING AND CORRUGATING COMPANY, of Cincinnati, report very active trade at the present time. They have recently made another important addition to their shoproom, thus still further increasing their manufacturing capacity. We are informed that they are shipping to South on five different orders for iron roofing and siding a quantity aggregating 2250 squares. They are also shipping to the Kentucky Fair Grounds 200 squares, and to the Pennsylvania Fair Grounds some 260 squares. Among recent orders they mention ceilings for two churches in the State of New York. This work is to be put in place in the form of panels with mitered corners.

GUMMEY, SPERING, INGHRAM & CO., inform us that they have recently shipped a large order of Patten metallic shingles to Xenia, Ohio, to be used in covering the roof of the residence of Mr. C. F. Hunt. They also inform us that these shingles are being used on a residence in Crawfordsville, Ind., the contract being in the hands of Barnhill, Horriday, & Pickett, the well-known roofers of that city. The trade in metallic shingles is on the increase, and the demand for them is growing as the public become better informed of their merits. A special advantage in comparison with slate is the saving in weight in the covering material.

THE NATIONAL SHEET METAL ROOFING COMPANY have recently shipped to the Soldiers' Home, Fort Leavenworth, Kan., 124 squares of 10 x 14 shingles made from IC Camaret plate. Altogether they have put on the Soldiers' Home at Fort Leavenworth nearly 800 squares of this kind of covering. They also inform us that in the third week of August they made larger shipments than ever before in the history of their business.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

VOLUME VIII. NEW YORK, OCTOBER, 1886. NUMBER 10

## NOTES AND COMMENTS.

ONE OF THE incidents of the earthquake at Charleston was the large amount of dust created by the destruction of some of the buildings, and more particularly by the stripping of mortar from the walls of buildings which had been plastered on the outside. One of the criticisms made concerning the way of erecting buildings in Charleston, growing out of the damage done by the earthquake, is that a very poor quality of mortar has been employed. A prominent New York builder who visited that city soon after the earthquake is reported to have said that much of the damage done was due to carelessness in building and imperfect work. The mortar he particularly condemned. He says that in some instances scarcely any traces of lime and cement could be found in it. He then advises that in the rebuilding of Charleston there should be an official inspector of building materials and buildings in process of construction, so as to secure better work.

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OF OUR OWN KNOWLEDGE we cannot assert as to the correctness of the opinion that Charleston buildings have been put up with poor mortar, but it would seem from the wholesale destruction that occurred in certain portions of the city, while other parts escaped with far less injury, that faulty building may possibly be responsible for some of the damage. From the fact that nearly one-half of the people killed on the occasion named lost their lives from bricks hurled from the chimney tops, it would seem that the proper construction of chimneys is a matter which has also been neglected. The critic already referred to advises Charleston people to abandon the old chimney top in their rebuilding, and to end their chimney shafts near the roof, finishing them with light terra-cotta pipes, or "chimney-pots," as they are called.

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THE AUTUMN building business throughout the country promises to be fairly active, although it will not reach the proportions that some of the more sanguine people in the trade have prophesied. Many operations that were put off in the early part of the year on account of labor difficulties have been resumed during the past few weeks. This has had the effect of increasing the activity of the latter part of the year, and has even been an embarassment to sub-contractors in some instances, because work has been demanded of them which they had long since ceased to expect or make any provision for. Particularly is this the case in Philadelphia. In New York there is a very large number of buildings in process of construction, and the total of the year's business in this city will compare favorably with that of other years. The present dispute between the master plumbers and their journeymen does not effect building in general, but will perhaps serve to delay the completion of a number of structures. The outlook in Pittsburgh is said to be very promising. The permits issued to date in that city are within a very small number of the total number issued for the corresponding period of last year. The feature in Pittsburgh is the large number of small buildings which are in progress. It is pointed out that when men of small means are able to build, the general prosperity of the community is evident. The building trade in St. Louis is reasonably active, and the same may be said with reference to Chicago. Minneapolis and St Paul continue to show evidences of the wonderful prosperity of the Northwest. Omaha and Kansas City are not backward. In Cincinnati, according to one of the architectural papers published in that city, building interests have reason for congratulation. This, however, is asserted in face of the fact that building is less active than it was hoped it would be on account of the dispute between the master builders and the bricklayers. The manufacturers of the Ohio and Mississipi Valley in general are said to be busy, and builders throughout the smaller towns of this region are enjoying a fair degree of prosperity. Altogether the present condition of the building trade is favorable.

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ONE OF THE Cincinnati daily papers describes a house in that city which is said to be earthquake-proof. It stands on the east side of Pike street, and now shelters David Sinton, the venerable millionaire, and Mr. Charles Taft, his son-in-law, and their family. Report has it that the house was built in 1815 by Martin Baum, who still retained a vivid recollection of the earthquakes of 1811 and 1812. He believed that there would be future developments of the same dread and mysterious subterranean influences, and he built in that belief. The house is a one-story structure of great superficial dimensions; the walls are of cubic dimensions sufficient to sustain at least 100 times their present weight, and iron girders and stout iron braces in every corner render the building proof against the lateral movements which were the most destructive feature of the earthquake of 1811. This is proof in itself of the impressive lesson of that early disturbance.

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THE DIVISIONS of time are something with which we are so familiar in their recurrence in life that we seldom give the reason for the divisions which we employ any particular thought. At the same time, the subject is an interesting one, whether it be considered from the popular standpoint or in view of the scientific reasons which may be given for the use of the methods which are in vogue. In the August issue of the *Popular Science Monthly* Prof. Issac Sharpless presents a number of facts that cannot fail to interest all who give the subject any attention. A brief quotation will perhaps be welcomed by our readers. The writer referred to says: "The natural divisions of time are the year and the day. The week is arbitrary, being probably derived from considerations first suggested by the first chapter of Genesis. "The month, though originally intended to be the time from one new moon to the next, has of necessity departed from this idea in order to make an even number in the year. The decade and the century are purely artificial, deduced from our system of numbering. But the day and the year, the one derived from the reappearance of light and darkness, the other measuring the round of the seasons, are universally adopted units of time, suggesting themselves alike to cultured and savage, and which we cannot think will ever be superseded. The year is the time of the revolution of the earth around the sun. Its measure is most easily obtained by the reappearance of the sun at the same altitude in the sky. Every one knows that it is higher in summer than in winter. If the circle of the earth's equator were extended right out from the center of the earth into the sky it would cut out a circle there which is called the 'celestial equator.' Now, the sun crosses this line in the spring northward, arriving at its greatest altitude in the middle of summer; thence it descends, crossing the line southward in the fall, and reaching its lowest point in midwinter. The ancients, by measuring the length of the shadow cast by a vertical stick on different days of the year, arrived at surprisingly correct results as to the length of the year. In 450 B. C., Democritus asserted the year to be 365¼ days long, which is within about 11 minutes of the truth. Another ingenious device for the same purpose was that of the Egyptian astronomers, who set up a wheel parallel to the plane of the equator. When the sun was in this plane the shadow of the sunward side of the wheel would be exactly intercepted by the other, and the interval between two such occurrences would measure the year. Owing to the fact that the sun does not cross the celestial equator in the same place each year, this year, which measures the seasons, is a few minutes shorter than the exact time of the earth's motion around the sun."

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IT IS WELL KNOWN that prototypes of hollow beams are to be found in nature. Edwin Clark in writing upon this subject says: "We have many instances in the vegetable kingdom of the extreme rigidity and strength of circular tubes; the stems of the grass tribe generally are remarkable for their lightness and strength; the common wheat straw and the river reed are familiar examples in our own climate; but in the tropics the gigantic stems of the bamboo and other grasses tower 60 feet above the jungle, and are extensively employed as beams for covering buildings, and even in some cases as the transverse bearers of light suspension bridges. The angler's bamboo rod is the most perfect of tubular beams. Tapered off in proportion to the strain, its silicious coat (as in all the grasses) defies compression, while it is internally lined with woody fire to resist extension in every direction. Its strength, lightness and stiffness are thus equally marvelous, and we cannot fail to be struck with the

provision of diaphragms throughout the whole tribe to preserve the circular form, which addition would certainly have much modified the results obtained from thin circular and elliptical tubes of wrought iron. The bones of animals are oval, the depth being always in the direction of the transverse strain. But the more special province of the bones appears to be their action as pillars or struts, in forming immovable fulcra for the reaction of the muscles; and since any yielding would involve a great increase of motion in the muscle itself, we find bone among the most incompressible of known substances. The square form of stem characterizes a very extensive natural family of plants—the labiate tribe, of which the beautiful dead nettle of the hedgerows is an example, though it is difficult to assign any mechanical reason for this peculiarity, which appears rather to be typical of the general development of these plants. But in the feather-bearing part of the ordinary quill we have a most remarkable example of the strength of the rectangular form. Here, again, every dimension is tapered down in proportion to the strain, with an accuracy defying all analysis; the extended and compressed portions are composed of a horny substance of prodigious strength, though extremely light and elastic. The beam is not hollow, but to preserve its form it is filled with a pithy substance which replaces the clumsy gusset pieces and angle irons of the tube without interfering with its pliability. The square shaft is peculiarly available for the attachment of the deep vanes which form the feather, and, as the angular form would lacerate its active bearer, an exquisite transition to the circular quill at the base is another striking emblem of perfection. The imitation of such mechanics, so wonderfully adapted to such a medium, appears hopeless; but we are indebted to the flying philosopher if his attempt only calls attention to such design and induces us instructively to contemplate the beauty of a feather."

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THE KNIGHTS of Labor are considering the question of establishing a weekly newspaper to expound the views of organized labor on questions of public interest. If they are wise they will decide not to. Nothing is more dangerous to a movement of this kind than "an organ." It is sure sooner or later to make organized labor ridiculous, and to pass into the control of demagogues and cranks. A newspaper would do more to expose the weakness of the order, its lack of definite purpose, its generally impracticable character, and the limited knowledge and experience of its leaders, than anything else possibly could. It would, in fact, be suicidal.

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THE SCHEME proposed some time ago for placing boxes in different parts of a city which should automatically deliver paper and envelopes or postal cards, as the case may be, through mechanism actuated by a coin of the proper denomination, has found expression in Paris on a far more complete scale. The company responsible for the experiment has opened an establishment on one of the boulevards, to which an admission fee of ½ franc is charged. The building contains washrooms, and attendants are in waiting for brushing clothes or shoes. Its principal convenience, however, is in writing letters, all the necessaries, including pen, ink and paper being at disposal in one room. An adjoining room contains dictionaries, encyclopedias, directories and all such ordinary works of reference as are likely to prove useful to the letter writer. Elsewhere in the building is a reading-room which is kept supplied with all the Parisian and provincial newspapers as well as the leading papers of the European capitals. A post office and telephone complete the list of conveniences which may be enjoyed at an expense of about a dime. The establishment is of an experimental nature, but if financially successful it will be followed by a number of others in different parts of the city. It appears that the idea was borrowed from Italy, where the establishments formed part of the postal system of the country, and were controlled and run by the Government. The entrance charge to the Italian writing-rooms was only about 2 cents, but then it was more scantily provided with conveniences. Paris, probably more than any other city of the world, is best adapted to make an experiment of this kind successful, for it has a very large floating population, and many of its inhabitants are of the Bohemian class, to whom these writing-rooms would prove most convenient institutions.

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THE POLICY adopted by some large employers of labor of discriminating against members of trade unions and labor organizations in engaging hands is, in our judgment, the most unwise which could be followed. The workmen may be induced to form an alliance with employers for their mutual advantage, but they become restive and intractible when an effort is made to deprive them of their rights. The true policy of the employer is to make no distinction between union and non-union men, and to refuse unconditionally to aid the unions in compelling those who prefer independence to join them. The employer who consents to discharge good men because they will not join the unions and submit to the fines and penalties usually imposed upon them for not having joined sooner, places himself completely under the control of the worst elements of organized labor, and has no reason to expect fair or just treatment at their hands. In dealing with workingmen a little tact usually accomplishes more than a great deal of bluster and obstinacy. For example: Not long ago a manufacturer employing more than a hundred men was waited upon by a committee of the union to which a majority of his workmen belonged, and was told that it would be necessary for him to discharge 10 non-union men in one of his departments. To have refused unconditionally would have led to a strike, entailing serious inconvenience and loss. After considering the matter for some minutes he replied: "Well, boys, this is not a good time to quarrel. I am running fuller than the state of the business warrants, and have been thinking of reducing my force. At the end of the week I shall have to discharge 20 men. These will include the 10 non-union men you object to, and I will leave it to you to pick out the 10 union men I am under the necessity of parting with. Whenever you are ready to report your list of names I will notify the 20 men that I shall not have work for them after Saturday." The committee reported back to the union, but the list was never furnished, and the non-union men are still at work. The alternative presented to the committee was a perfectly fair one, and it carried vastly more weight than argument or angry contention. The manufacturer's interest is to "show fair" in the struggle between independent labor and labor controlled by the unions, and if possible to ally all in his employ so closely to himself by the ties of self-interest that there will be no inducement to take shop questions outside the shop for adjustment. Whether a man belongs to a union or not is a question with which the employer has no occasion to concern himself. When he has established such relations with his men as are possible and eminently desirable it will have very much less interest for either than it now possesses.

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AN EXPOSITION is to be held in Washington, at which the exhibits will show the results of negro labor. Its purpose is to prove that the colored race is not by nature incapable of successfully working in industrial pursuits. There will be exhibited specimens of castings and machinery made by colored workmen employed in some of the large works, which will demonstrate the ability of the negro to do work requiring more thought than the picking of cotton or the hoeing of corn. Though this is not the place to discuss the intellectual status of the negro, it is fitting to call attention to some of the previous conditions of the life of this people which have influenced public opinion regarding the race to a large degree. The South, formerly an agricultural country, gave little opportunities for learning trades, even had the slave owners held it advisable to instruct the negroes further than teaching a few principles in agriculture. It was not until within a few years that negroes found it possible to get an opportunity to do work other than the commonest manual labor, and still more recently that they have made use of this new privilege to any extent. There have always been plenty of cases of individuals who as mechanics and artisans have advanced to superior positions, but instances of this kind are comparatively rare, partly, if not mainly, for the reasons we have noticed. Within a few years more apportunities have been afforded the negroes for proving their capabilities for work requiring the exercise of intelligence as well as physical exertion, and results, so far as we know, have been in every way satisfactory. Perhaps the most striking instance of the kind is the employment of negroes in iron foundries, where the work is of a decidedly high order. To be an efficient molder requires care and judgment in no small degree. The preparation of the molds, particularly the removal of the patterns from the sand, the touching up of the broken corners and the replacing of the upper half of the mold is impossible by a clumsy workman, while the proper ramming of the sand calls for the exercise of considerable judgment. In all the delicate manipulation incident to the work of the molder the negro has shown that he is possessed of the necessary qualifications, and, though the average negro is perhaps inferior to the average white man for such work, the difference is not enough to debar the former from competition. We have instanced molding because it affords a better test than most occupations, though it is by no means the only industry in which negro labor has been successfully tried.

## THE PLATES.

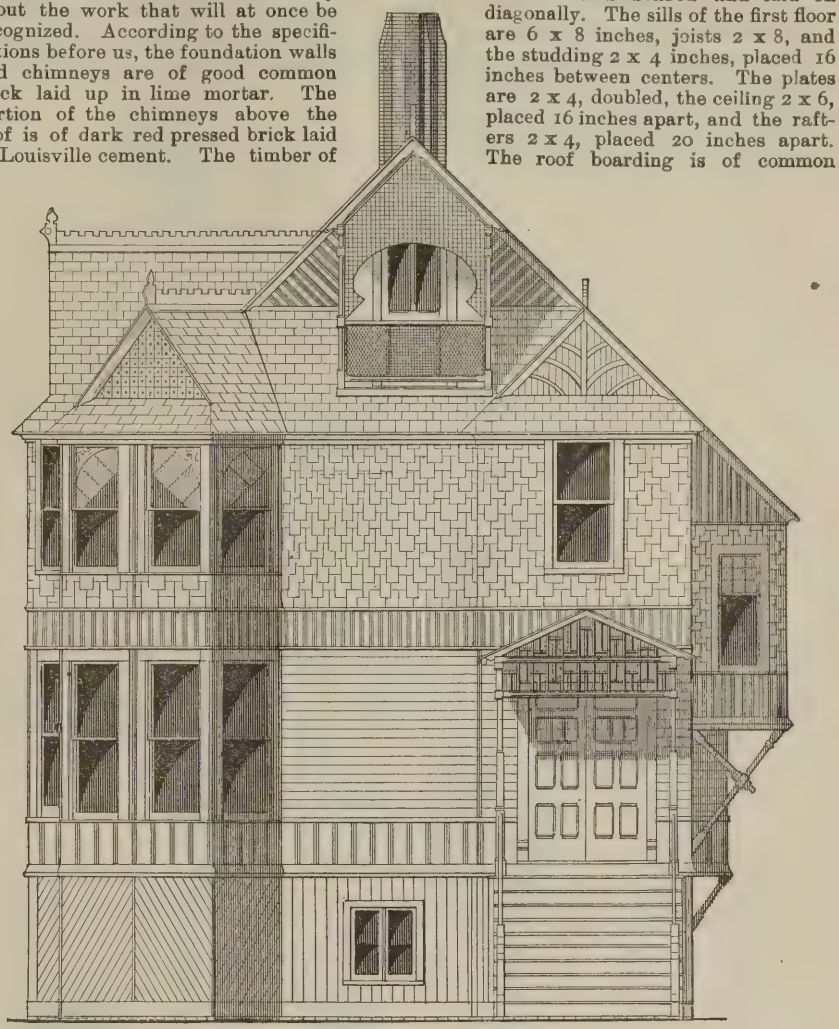
Plate XXXVII of this issue contains what the designer calls "furniture for the spare room." It represents a very neat and appropriate set for a bedroom, the designs being by Mr. Henry Pringuer. The following description is in the designer's own language: "In connection with the furnishing of a house nowadays the spare room is a most important apartment, and claims special attention as to the choice and character of its furniture. This might be of such a description as to admit of its adaptation to sitting or retiring room purposes. The guest or visitor frequently desires strict privacy in order to write letters or study, and the bedroom *suite* in question will, we think, answer such requirements. The dressing table is designed so as to look when closed like a cabinet. The upper part of

the box which incloses the toilet glass, being hinged to the lower part, opens out and falls into position in the form of shelves, as illustrated by the left-hand corner sketch. The glass frame is pivoted at the top corners and let into the backboard. Its adjustment is controlled by the back part of the drawer, which is higher than the front, which, when drawn out, levers the glass to any desirable angle. The open space in the center of the carcase is convenient for the reception and manipulation of a small portmanteau, as by such an arrangement the visitor has more immediately its contents at hand. The recesses at the side are for boots and such like articles. The appointments of the wardrobe are so arranged as to give it more the character of a bookcase. The top is fitted up for the reception of books and the display of artistic trifles. For the purpose in hand this is a more desirable feature than a dust-collecting corner. The washstand is constructed upon the same principle as the dressing table. The slab upon which the basin stands should be marble, and the inside of the inclosed part lined with enameled iron for the sake of lightness. The appearpearance of the washstand when open is shown by the sketch in the right-hand corner."

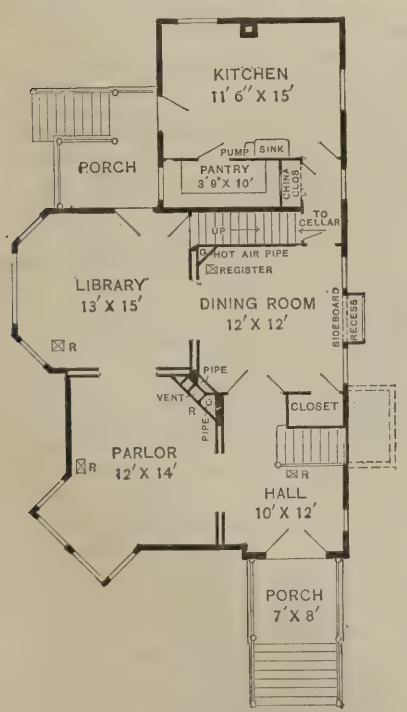
Plates XXXVIII, XXXIX and XL show the front, plan and a portion of the details of the fittings of a drug store designed by Mr. Arnold W. Brunner, of Brunner & Tryon, No. 39 Union square, west, New York. The store in question is located at Middletown, N. Y., and the work shown represents the refitting and furnishing which has been applied to an old establishment. The material of the front is oak, stained dark. The interior is of ash. The ceiling is paneled with ash strips, and the panels decorated. There are no chandeliers excepting the one in the screen, but brass standards placed on the counter are used instead. The drawings are very clear and show the nature of the work in a very satisfactory manner.

## Design for Basement and High-Stoop Frame House.

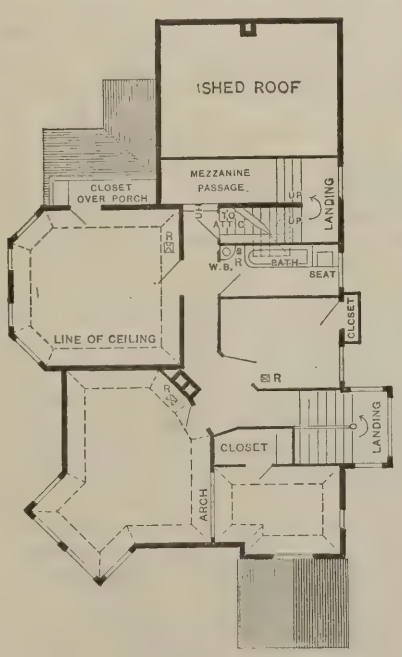
In the accompanying engravings we present the design of a house built some time since to drawings prepared by L. D. Bayley, architect, Cairo, Ill. The house is one that Mr. Bayley built for himself, and differs in several particulars from the conventional designs that are ordinarily encountered in architectural papers. The character of the ground in Southern Illinois and other circumstances have varied the design, as well as the construction, in different particulars. At the same time there is an individuality about the work that will at once be recognized. According to the specifications before us, the foundation walls and chimneys are of good common brick laid up in lime mortar. The portion of the chimneys above the roof is of dark red pressed brick laid in Louisville cement. The timber of the frame is of yellow pine. The outside finishing lumber is of poplar and cypress. The sub-sills are 2 x 6 inches, the corner posts 6 x 6 inches, the studding of basement 2 x 6 inches, placed 16 inches between centers. The outside is covered with poplar sheeting ⅞ inch thick and 6 inches wide, matched and beaded and laid on diagonally. The sills of the first floor are 6 x 8 inches, joists 2 x 8, and the studding 2 x 4 inches, placed 16 inches between centers. The plates are 2 x 4, doubled, the ceiling 2 x 6, placed 16 inches apart, and the rafters 2 x 4, placed 20 inches apart. The roof boarding is of common fencing surfaced. The sheeting of the walls is of the same material put on diagonally and reversed at each end, and all thoroughly nailed. The outside walls of the first story above basement are covered with No. 2 felt paper, and over this 6-inch clear siding is placed. The walls of the second story and also the roof are covered with best Mobile cypress dimension shingles. On the roof the shingles are laid 5 inches to the weather, and on walls as indicated by the drawings. The gutters are made of IX bright tin plate. The construction of steps, porches, &c., is shown by the drawings. The painting is three-coat work, done with H. W. Johns' asbestos liquid paint. Hardware for the first floor has bronzed trimmings and hemacite knobs. For the other parts of the house the trimmings are amber bronzed. The windows are all double hung and boxed for weights. The glass employed is the best American, double thick. The stationary windows in the library and above on the second floor, also in sideboard recess in dining-room, and the top sash to windows for stair landing and likewise the top lights in front doors, are glazed with good quality cathedral glass in colors. The 12 small lights in front doors have 6 x 6 inch prismatic colored glass. The inside work, details of which are shown in the accompanying drawings, are of yellow pine, with gum in caps, panels, &c. The stair treads and risers are of yellow pine, and the newels, rails and balusters are of oak. The inside work is filled and finished with Berry Brothers' hard-oil finish. Electric burglar alarms are placed on all outside openings on first floor and basement, and electric bells are employed throughout the house. The estimated cost of this house, according to the architect's schedule, including plumbing and gas-fitting and a furnace, is less than $3000,



*Front Elevation of Frame House with Basement, Designed by L. D. Bayley. Cairo Ill.—Scale, ⅛ Inch to the Foot.*




First Floor.




Second Floor.

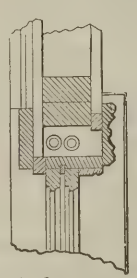
*Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.*

a figure which would be considered very low for such work in various portions of the country.

### Roofing Slate in India.

Mr. A. G. Studer, United States consul at Singapore, in a report recently published, presents the following:

I am informed that the manufacturers of black roofing slate in the United States are desirous to obtain information respecting the uses of that article in India; that the slate area in the State of Pennsylvania was almost inexhaustible and as rapidly developed as the demand increased; that the manufacturers were desirous of extending their exportations to India; that large quantities had been shipped to Australia and other distant countries. Last year I answered Messrs. Boyle & Co., slate exporting financiers, of Philadelphia, anxious to extend their trade hereabouts, after recommending to them the appointment of an agency, to send to the same a trial consignment (which holds good to-day), as follows: "Thus far little slate for roofing has been used, tiles being generally used throughout India, and for cheap, light buildings (bungalows) the leaf of the attap palm (thatch). It would be best to forward and consign a sufficient quantity for trial and introduction. I feel morally certain that without doing this you will not get orders. What slate has been used here for roofing (on Government buildings chiefly) was imported from England, and you are better able to judge as to whether you can compete with that country. The cost of freight on a sailing vessel would be about the same from Philadelphia as from an English port, I think."



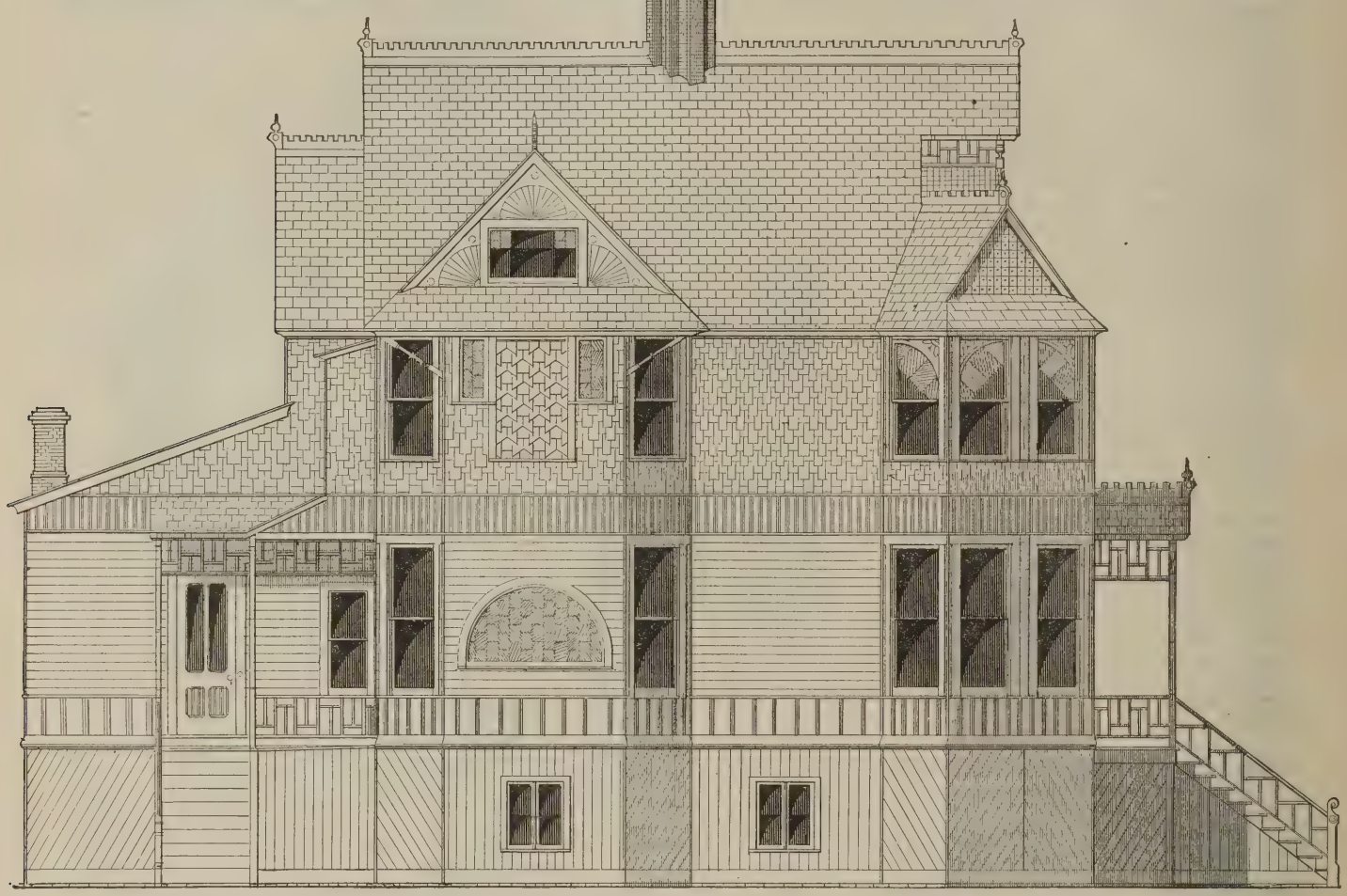
*Section Through Window.—¾-Inch Scale.*

Being directed to report upon all India, I must confess that, while I am pretty well informed about that vast country and islands belonging thereto (British and Dutch), I have never yet been in Upper India; but there are many here who have been there, and they tell me that for roofing houses about the same materials are used as in this colony, as follows:

1. For all substantial buildings (Governmental, mercantile and residential) the half-round tile (made of brick clay and baked) is used. These are easily laid (joining in and out, under and over, and overlapping each other), and make an excellent, durable as well as cool roof in a tropical country, as they furnish air currents throughout (in a cold climate, unless covered with water or cement where they lap and join, they would not answer). A tile roof is, of course, very heavy, but, as there is an abundance of very hard wood out of which to make timbers and frames able to bear it, it does not matter. Coolie labor is very cheap (ranging for all India from 8 to 20 cents per day), clay and fuel abundant, and as a rule very near each other, and therefore tiles can be had cheap.

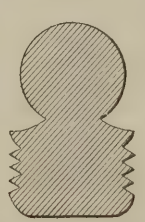
2. For plantation and cheap European residences, bungalows and the dwellings of the native population in suburban and country districts and on farms, all having as a rule far projecting roofs, the leaves of the attap palm, the kadjang (a species of huge grass growing on low, marshy river bottoms, shallow lakes and lagoons in vast fields, as I have seen in the swamps of Kassang River, near Malacca)* and sundry other tough, broad grasses and fibers suitable for thatching are used and give general satisfaction, being very abundant, cheap and answering their purpose well. A well-made attap or kadjang roof will last from three to four years, when it becomes brittle, and as a consequence leaky, and must be removed.

3. For the roofs of coal sheds, wharves, warehouses, landings, bazars and markets, verandas and other airy, light shed-like structures, having no walls and only posts or brick pillars for support, corrugated sheet iron or fluted zinc sheets, this, with steadily increasing tendency, is used. This kind of roofing was first introduced here about 12 years ago.



*Side Elevation of Frame House with Basement Story, Designed by L. D. Bayley, Cairo, Ill.*

As to black slate for roofing, it has been used, to my knowledge, on two new Government buildings having mansard roofs within the last two years—*i. e.*, police headquarters and post office, one mercantile building and two churches. This slate, as none has ever been kept for sale here, was imported from Wales, where, there being large quarries of it, I am told it is very cheap. Firms in the United States engaged in the manufacture and export of slate can easily find out whether they can successfully compete with English quarries in Eastern markets, the cost of freight being about the same from our Atlantic ports as from ports in England (on sailing vessels, I mean). Summed up, upon careful consideration and reflection (referring more to my consular district than all India) I hardly think that the sale of slate for roofing from any country will ever amount to much in the tropical part of Asia. But, as some will be used, perhaps more and more as civilization, with a higher taste for architecture, advances, it would, I think, be well for our American slate exporters to create agencies in the principal ports of India, and to forward to them trial consignments (not too small) of their productions. I know of no better way, if they can only compete with

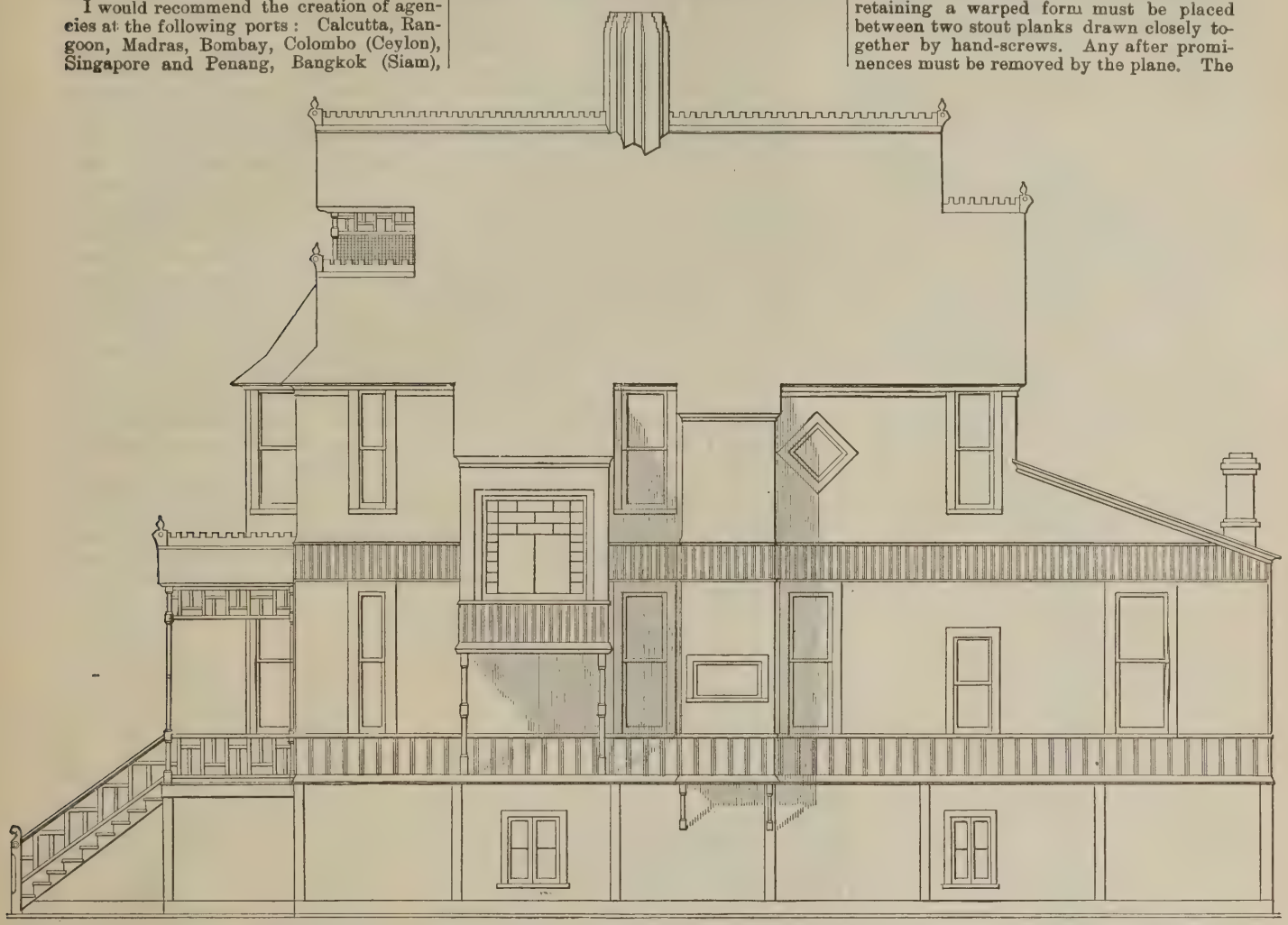


*Section of Stair Rail.—3-Inch Scale.*

*I have read in some naturalist's books that the kadjang is a palm-leaf, which is absolutely not the case. It grows about as tall as an average cornstalk out of water; its leaves resemble in shape and length and breadth a corn leaf, but have a saw-like, jagged edge. The stem of the kadjang is about as thick as a cornstalk, and as readily cut.

English or European exporters. It must be borne in mind at the same time that, Calcutta and perhaps Bombay excepted, we have no American firms in British or Netherlands India, and must rely on foreign merchants for the sale of any kind of American merchandise.

I would recommend the creation of agencies at the following ports: Calcutta, Rangoon, Madras, Bombay, Colombo (Ceylon), Singapore and Penang, Bangkok (Siam), Batavia, Sourabaya and Samarang, in Java, and Manilla (Philippine Islands).

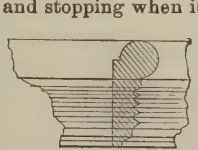


*Side Elevation of Frame House with Basement Story, Designed by L. D. Bayley, Cairo, Ill.*

## The Small Shop.

Thomas C. Weeks, chief of the Bureau of Industrial Statistics and Information for the State of Maryland, in his recent report, says the *Age of Steel*, makes an earnest plea for the "small shop." Careful observation and practical experience has shown him that the number of skillful mechanics (men who can construct as well as create) is growing less; that in this respect we have drawn largely on the foreign element and neglected the cultivation of young native talent; manufacturers are constantly in want of skillful men, properly equipped, with a practical knowledge of their trade. Such men as a rule, come from small shops and not the large factory. They are the result of the shifts and contrivances which are necessary in a shop which is not supplied with the endless resources of modern tools and machines, and they are by far the most accomplished mechanics; they are handy men for a pinch, and it is beyond question that a policy looking to the encouragement of the small shop would be more generally beneficial than that which is adopted for the increase of large concerns. It is not so much in the increase of production than a State is benefited as by the regularity of employment enjoyed by her citizens. The multiplication of the small shops relieves the labor market, tends to advance wages, and directs a current of skillful mechanics to our small towns and villages, bringing the manufacturer closer to the agricultural producer—to their mutual benefit.

The boot-maker who from measuring the foot can complete the boot without the aid of machinery is the man who, away from the great centers of industry, can open his own shop and with his kit, skill and perseverance thrive on his own labor. And what is true of the boot-maker is true also of other trades—the cabinet-maker, blacksmith, machinist, carpenter, &c. But in the city, where large capital commands the most perfect machinery, there is but little scope for the average man, and he is reduced to a life of toil, keeping pace with the machinery of the shop, going when it goes and stopping when it stops. That this condition of labor tends to reduce wages, retard the circulation of money, and lower the intellectual standard of workingmen, must be evident. The man whose place at the machine can be taken by almost any hand applying for work, whose task can be learned in a few months or less, cannot demand any great remuneration for his labor, or maintain his position without many sacrifices, and the monotonous nature of his occupation, requiring no original thought or particular application, leaves the mind without expansion and effectually blunts the keen edge of individual ambition.



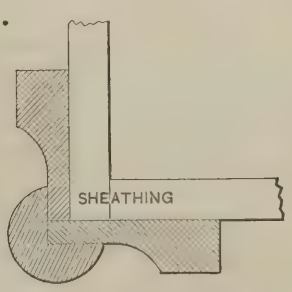
*Picture Molding.—3-Inch Scale.*

**Warping of Wood.**—Straight-grained goods are not subject to any considerable change in the lengthwise of the grain, but a distortion called warping is very prevalent in the soft as well as in the hard varieties in the cross directions. Thin boards are sometimes curved like a bow in their cross sections. The first method to be tried to restore these to their original condition is to range them round the shop, with their convex sides to the fire, or place them in the sun, when the evaporation of the moisture causes the wood to contract, so bringing it to its proper shape; but the wood must not be too long exposed, as the board will become convex on the side next to the heat. This may be avoided by frequently changing the sides. If the wood is too much distorted to yield to this treatment it is to be bent as straight as possible by the hands, and if still retaining a warped form must be placed between two stout planks drawn closely together by hand-screws. Any after prominences must be removed by the plane. The finely-figured woods, which chiefly owe their beauty to the great irregularity of the grain, would be very liable to twist if employed of the same thickness as the straight-grained descriptions. It is their being cut into thin slices that saves them.—*Cabinet-Maker and Upholsterer.*

## Seventeenth Competition.

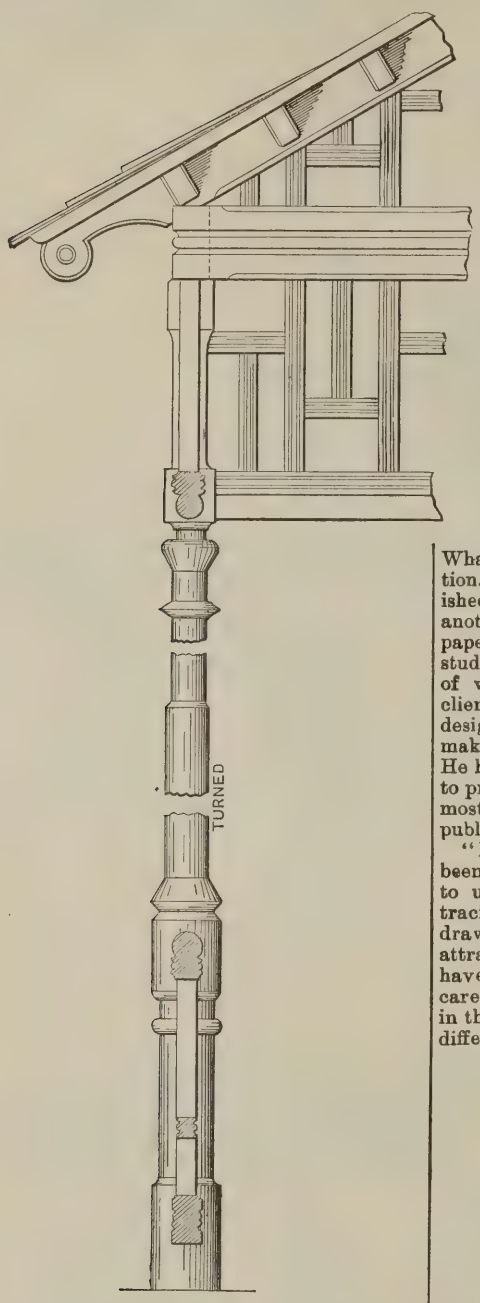
(Concluded from page 163, September issue.)

"Chicago" (No. 47) presents a study which gallantry perhaps should cause us to pass by in silence or to say nothing concerning that which is not pleasant to read. This design enjoys the distinction of being the only one in this contest coming from a woman. The study is above average merit, but has several glaring faults from the Editor's standpoint. These, however, are of a character to be corrected, and that, too, in a way to be of advantage to the aspirant in




*Corner Beads.—3-Inch Scale.*

her professional career. The floor plans seem to have been carefully studied and the house has more than the usual conveniences. Closets are supplied in all the bedrooms save one, and they are all of ample size. Among the blemishes we note that lines representing the walls have been put in with a brush, and are not neatly done. This we would hardly expect from such a source. There is a




*Frame House, Designed by L. D. Bayley.—Detail of Porch.—Scale, ¾ Inch to the Foot.*

smudgy appearance in the floor plans which detracts greatly from the quality of the work. Features of construction most prominent in the details are such as would cause practical builders, in some instances at least, to smile. Evidently they are borrowed, rather than drawn from personal knowledge of the way in which material should be put together. For example, it would be very difficult, if not impossible, to construct a box window frame to correspond with the horizontal section that is shown. There is also a sketchiness, so to speak, about the elevations, which is anything but satisfactory from a builder's standpoint. Lines are used in many cases where they are meaningless, and there is a general indistinctness which makes it impossible to obtain measurements with a scale or rule. We would not by any means discourage "Chicago" from her efforts in her chosen field, for we believe that with proper training and careful practice she can make a name and position for herself. Therefore she must think kindly of what we have said of her drawings, for what we have offered is simply friendly advice.

"O. E." (No. 54) included in his drawings something that most of the other competitors omitted, namely a longitudinal section through the building, giving many particulars of design and construction which could not otherwise be obtained from the drawings. The house shown is an agreeable variation from the conventional "Queen Anne" which many of the designers have affected, and ranks above the average of those outside of the prize and special-mention designs.

"L. A. W." (No. 26) in his details gives special attention to the shelving and general arrangements of the pantry and china closet. About one-third of the details submitted relate to these two items. The other details show how to construct box window-frames, and include a section through the outside walls and the porch steps and balustrades.

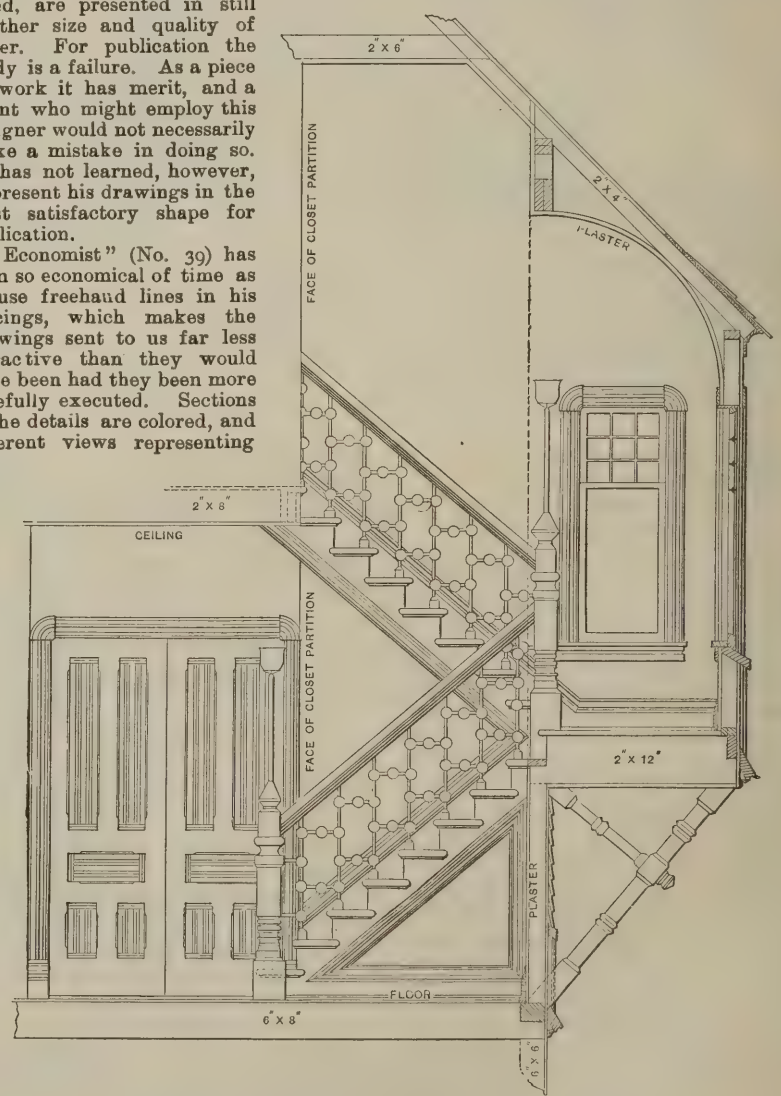
"Ridnye" (No. 56) has employed a variety of sizes and styles of paper in presenting his ideas for consideration in this contest. A manila paper cover with an appropriate side title contains front and side elevations, floor and roof plans, and is in a certain sense a complete study by itself. These sheets are on tracing linen. Outside of the portfolio, also on tracing cloth, is an alternative elevation, and on a sheet of Whatman paper a second alternative elevation. Details in pencil, only partially finished, are presented in still another size and quality of paper. For publication the study is a failure. As a piece of work it has merit, and a client who might employ this designer would not necessarily make a mistake in doing so. He has not learned, however, to present his drawings in the most satisfactory shape for publication.

"Economist" (No. 39) has been so economical of time as to use freehand lines in his tracings, which makes the drawings sent to us far less attractive than they would have been had they been more carefully executed. Sections in the details are colored, and different views representing the same parts are connected by freehand lines, which detract much from the value of the work.

"Sequoia" (No 51), "Frosch" (No. 52 and "Dakota" (No. 59) submitted designs which are above the average of the majority in quality, but which have no distinctive merits to recommend them to attention. There is an amateurish quality about the details submitted by "Dakota," and he loses by holding to very small pieces of paper. The scale employed is too large for the size of paper used. "Sequoia" has employed brush shading and colors in his elevations and plans. "Frosch" displays good draftsmanship in both elevations and floor plans.

The design submitted by "Junius" (No. 77) is in many respects typical of efforts that are nowadays made by draftsmen to reproduce old fashions in buildings in combination with modern appointments. The design itself may be characterized as a close immitation of the old gambrel roof mills which were common in the last century, with an addition, if not two additions, built in the rear. Remembering always that in this competition the desirability of the design submitted for publication was the test, we are justified in criticising features which otherwise might pass without attention. Those who are seeking the grotesque and odd in architecture might be pleased with such a study as this, but the average builder would have comparatively little patience with it. The details submitted are very meager, but so far as they go are excellently drawn, and in draftsmanship the study is among the best that were submitted in this competition.

"Dick" (No. 28) is evidently a beginner at the architectural profession. For paper on which to put his drawings of elevations and details he has chosen common news print not so good as that upon which this journal is printed, and consequently unsuited to the purpose. His drawings are partly in pencil and partly in ink, and throughout show a need of technical drill. Constructive features are also lacking, showing that experience is yet to be gained. This designer shows stairs with 9-inch rise, 14-inch tread, and a hand-rail the short baluster of which measures less than 15 inches.

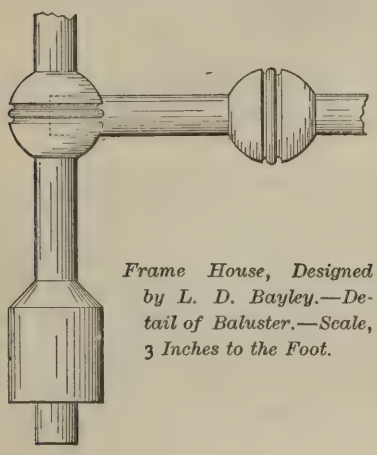



*Section Through Hall.—Scale, ¼ Inch to the Foot.*

## The Preservation of Wood.

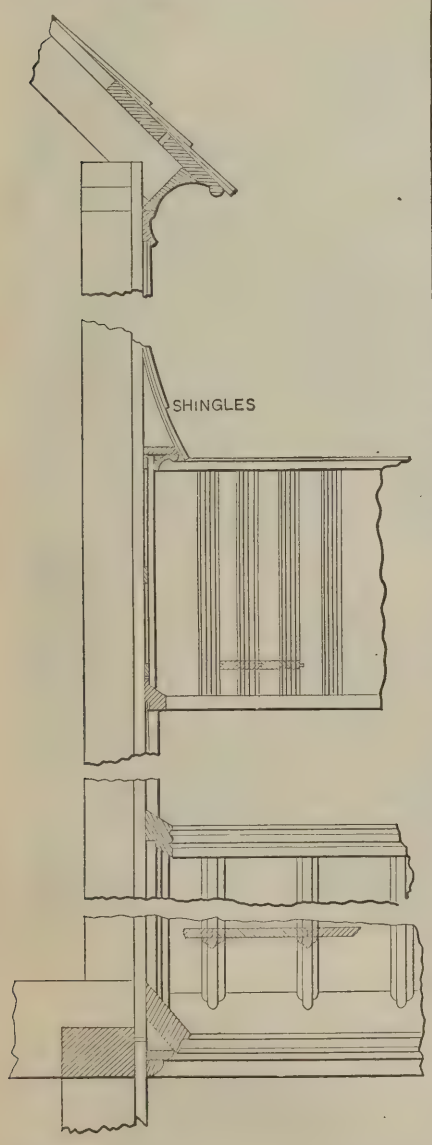
P. H. Dudley closes an article in the *Popular Science Monthly*, upon "Woods and Their Destructive Fungi," with the following interesting paragraphs:

One important aid in the preservation of



*Frame House, Designed by L. D. Bayley.—Detail of Baluster.—Scale, 3 Inches to the Foot.*

timber will be, for those whose duty it is to care for it, to acquire more practical knowledge of the fungi which grow on it, and this is not a difficult task. What is needed is to call the attention of the men to the



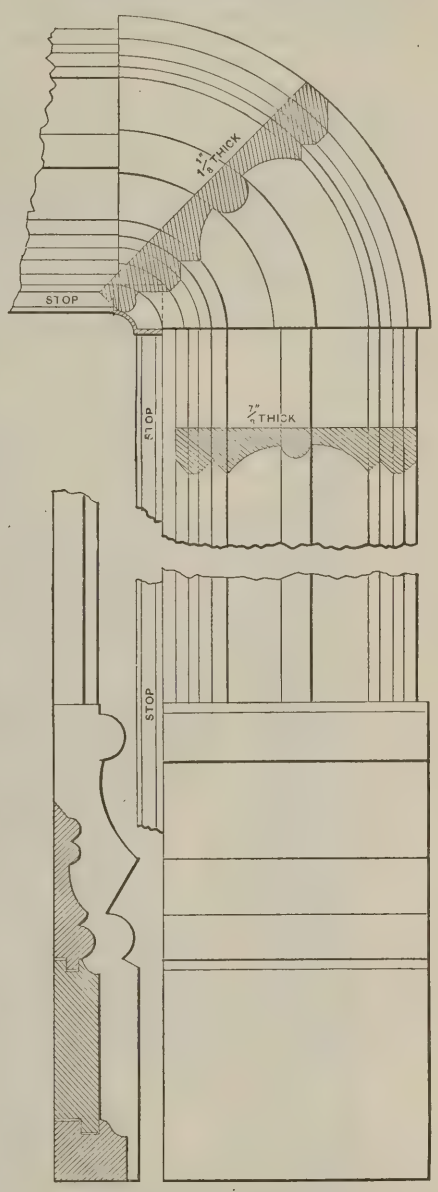

*Section Through Water Table, Showing Elevation of Base Paneling and Belting Course.—Scale, ¾ Inch to the Foot.*

conditions and to the prevention of the growth of fungi. The literature about it is meager, only foreign text books having been published which describe the general species. Prof. Charles H. Peck, in the reports to the New York State Museum of Natural Hlstory, from the 23d to the 38th, inclusive, has described a great many species of fungi, and has made the most important American publications to date. For practical use he has done a valuable work in the collection and mounting, in the State Herbarium, at Albany, of over 2600 species, where one can in a short time learn to identify the ordinary species found upon ties and timber. In the Columbia College Herbarium these is a collection of nearly 3000 species of the general fungi of this vicinity, which is also open for study. The facilities for taking up the practical work are abundant. Every railway company has men of sufficient aptitude to learn to identify species and study their conditions of growth and form, from the materials which can be found upon every mile of their lines, collections of decayed wood, from which the employees can gain knowledge to be put into daily practice to check much of the unneccessary decay of all their woodwork of ties, bridges, cars and buildings. The cheapest operation to protect our woods, and quite sufficient for many purposes, is to season or thoroughly dry the timber, reducing the contained moisture from 8 to 12 per cent. of the weight of the wood, and when in this condition, with a circulation of air around it, to prevent the collection and absorption of moisture, the wood will last indefinitely, as the fungi cannot grow in such surroundings. Every one is more or less familiar with the soundness of timber in the upper part of buildings, while in lower parts near the foundations it is often decayed on account of moisture.

In many situations, however, where timber must be used the conditions of growth of the fungi are present and it will decay. Some species can be used which resist the attacks of the fungi for a long period, but the final result is decay unless the wood is treated by some process preventing the growth of the fungi, which must be capable of doing either one of two things: 1. It must keep the fibers dry, preventing the absorption of moisture. 2. If the wood must be in a damp place and kept moist, some antiseptic must be present sufficient to prevent the growth of any of the various kinds of destructive fungi. Timber entirely submerged does not come under these considerations. To use the first process successfully means more than a thin coat of paint or tar on seasoned wood when exposed to continued moisture. It must be some substance which penetrates the tissues of the wood sufficiently far, in case the exterior surface is broken, to prevent any absorption of moisture. Wood impregnated with the heavy tar or lighter oils are protected more from the fact of prevention of access of dampness to the fibers than by the contained antiseptics, unless in the exception of a great percentage of creosote. In the second method the moisture is permitted to come in contact with the fibers of the wood, and reliance depends upon the antiseptic. In this case the entire wood should be saturated to give the greatest measure of success, not merely an exterior protection of ½ inch or so in depth, the latter fact, as before explained, being the cause of many of the failures which have taken place. The antiseptic treatment, to succeed, must destroy all the germs which have found lodgment in the timber, and also those which may come from the exterior.

In a general paper I can only indicate the antiseptics which have been fairly successful, though in many cases the failures were due not so much to the antiseptic used as to the faulty manner of application, which can be understood from what has been written. The four antiseptics which are most used now are chloride of zinc, creosote, corrosive sublimate and sulphate of copper; sulphate of iron and pyrolignite of iron may be mentioned. The treatment of the wood by bicloride of mercury (corrosive sublimate) was called kyanizing; by cbloride of zinc, burnettizing; by creosote, creosoting or the Bethel process; by sulphate of copper, Boucherie's process. Sulphate of copper has been used for over a century in preserving timber, and when well applied the results have been good. The idea of Boucherie was to force the antiseptic through all the wood cells, which was correct and the method successful in proportion to the extent it was accomplished.

The attempts to impregnate wood are made now with nearly all of the antiseptics in large cylinders capable of sustaining from 200 to 300 pounds of pressure per square inch, one end of which can be opened and closed for admission and withdrawal of timber. When the cylinders are filled with the



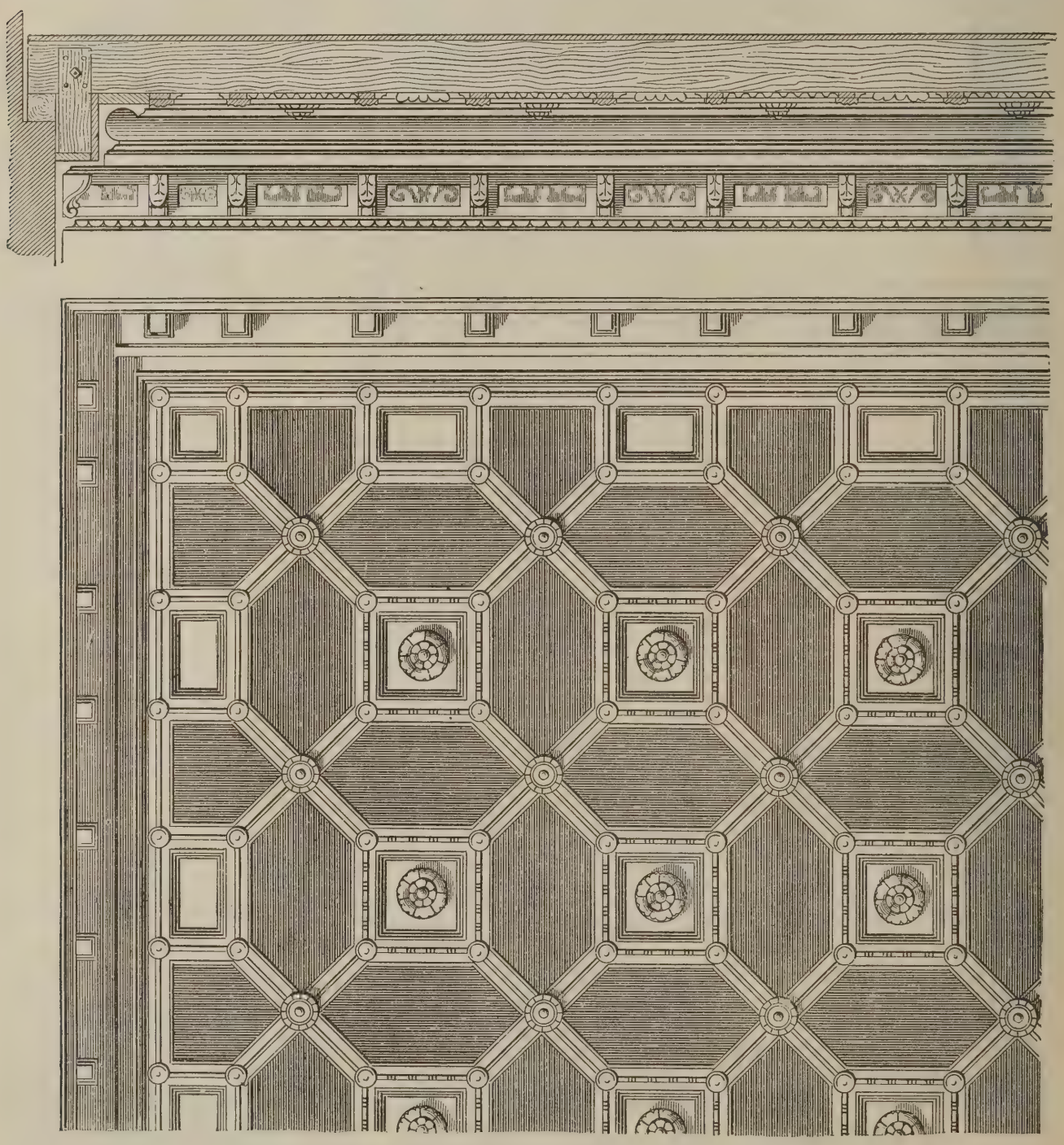

*Detail of Door and Window Trimming.—Scale, 3 Inches to the Foot.*

timber they are closed, then steam or heat is applied to vaporize the sap or moisture; after this a partial vacuum is produced and sustained for from 6 to 12 hours, then the moisture is withdrawn from the cylinders and the antiseptic is pumped in and raised to a pressure of from 120 to 150 pounds, which is maintained for from 6 to 24 hours. Porous woods are impregnated quite readily, while the heart-wood of the yellow pine and the white oak are not penetrated so easily and take longer time. The external pressure may be 150 dounds per square inch, yet the hydrostatic pressure in the cavities of the cells, not 0.0001 inch in area, is quite small, the impregnation being to a great extent by capillary attraction and absorption through the cell walls.

It is evident from preceding statements and illustrations that untreated railway ties in the road-bed are of necessity in about as favorable conditions for the growth of the fungi as could be selected, and consequent decay is not only probable, but certain and rapid. Ties of the most durable woods as a rule only resist decay for from 8 to 10 years, while inferior qualities only last from four to seven years.

## Sheet-Metal Ceiling.

Considerable attention has been given in this country to the manufacture of ceilings from sheet metal. Plain iron has been used, also crimped and corrugated iron. The latter has been worked plain—that is, without any attempt at dividing into panels—and has also been variously treated in order to overcome the unfinished appearance which plain work carries with it. Among the patented devices in connection with ceiling finish which are before the public may be mentioned diamond-shaped panels with peculiar joints and overlapping ribs with embossed corner blocks or intersections. The accompanying engravings show how a prominent sheet-metal firm in Germany are in the habit of constructing work of this class. The ceiling is ornamental in character, and if built and properly colored would present a very attractive appearance. The metal is worked in small pieces and is so combined as to have all necessary opportunity for contraction or expansion. The iron is managed in such a way that the corrugations run in different directions, and therefore afford a pleasing variety of light and shade. The overlapping ribs are well constructed, while the intersections are emphasized by a downwardly projecting rosette. Our larger cut shows a plan of the ceiling, with an elevation of the cornice or the juncture between the ceiling and the vertical wall of the room. The detail engraving presents portions of both parts to a larger scale. The illustration from which our engravings were prepared, and which was published in Germany some time since, is in colors, simulating so far as possible the work as finished and handsomely decorated. Our readers will conceive that it is impossible for us to give more than a suggestion of the appearance thus obtained, since we are restricted to a representation in black and white. Nevertheless, the cuts which we present will afford an idea of the work, and they are of a kind to be useful in the way of suggestions to many of our readers who make a practice of constructing ceilings.



*Design for Ceiling Finish in Corrugated Metal.—Plan and Section*

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The soundness of timber may be ascertained by placing the ear close to one end of the log, while another person delivers a succession of smart blows with a hammer or mallet upon the opposite end, when a continuance of the vibration will indicate to an experienced ear even the degree of soundness. If only a dull thud meets the ear the listener may be certain that unsoundness exists.

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## Chimney Construction.

BY C. POWELL KARR, C. E., CONSULTING ARCHITECT.

To design a factory chimney we must first know what work it will probably be required to perform. This work consists in its power to draw in through the furnace a volume of air sufficient to insure complete combustion. This work is measured by the amount of fuel burned per hour and the volume of gaseous products ascending the chimney.

The hight of the chimney-shaft is determined by the diameter of the section if round, or area if rectangular, and the section depends upon the volume of air employed in consuming 1 pound of fuel, on the main temperature which will be obtained in the chimney, on the loss of force occasioned by friction in flues and shaft, on the changes of section and direction, and on the resist-

ance of the grating. There is generally an advantage in giving to chimneys an excess of section, because this produces an excess of draft that can be regulated at will by means of a damper.

The volume of mixed gas evacuated by an extraction-shaft increases in direct ratio to its area, and proportionately with the square root of the hight and the square root of the difference of the external and interal temperatures. It has been found by experiment that, the internal temperature of a shaft remaining the same, an increased area has very little influence on the velocity of the ascending current, though an increased resistance is given by the additional surface exposed to the air in motion. Also, the cross-sectional area remaining the same, the velocity is not affected by the form of the cross-section; also for economical construction when large volumes of air are to be exhausted it is better to increase the area than to raise the temperature in the shaft; and where neither can be done and more draft must be obtained, by using the steam jet we can secure 25 per cent. more draft, and at the same time reduce the temperature in the shaft. It is assumed that the temperature throughout the chimney is uniform.

The weight of air discharged attains a maximum at a certain temperature, and an increase beyond that point results in a diminution of effect, and according to Professor Rankine the best chimney draft takes place when the absolute temperature of the gas in the chimney is to that of the external air as 25 to 12; that the head for the best chimney draft, expressed in hot gas, is equal to the hight of the chimney, and that the density of the hot gas is one-half that of the external air, and the best possible draft is insured when the temperature of the gas in the chimney is about 600° F., or from 540° to 550° above the external air. According to the researches of Mr. Johnson it appears that in ordinary boiler furnaces where the draft is produced by means of a chimney the weight of air required for dilution is equal to that required for combustion. With a forced draft less air is required for dilution, and there results a higher temperature of the fire, a more rapid conduction of the heating surface, more fuel per square foot of grate per hour is consumed, and a better economy of heat than can be obtained by natural draft. An insufficient supply of air causes imperfect combustion, with all its well-known attendant evils; an excessive supply causes a waste of heat to the amount corresponding to the weight of air, exceeding that which is necessary, and to the elevation of the temperature at which it is discharged from the chimney above that of the external air. With natural draft the total weight of air to be supplied to the furnace per pound of fuel sufficient for complete combustion and dilution is nearly 24 pounds and for forced draft about 18 pounds of air. The weight of fuel which can be burned in a given time in a given furnace depends upon the quantity of air which can be made to pass through the furnace in a given time, and may be ascertained by dividing the weight of air by the proportion which that weight of air bears to the weight of fuel which it can completely burn. Thus, knowing the volume of air evacuated by a shaft, the amount of fuel it can completely burn by natural draft will be very closely approximated by dividing the weight of said volume by 24. The proportion of the grate, section of chimney, flues and heating surface are generally given in terms of the grate area, which is the unit of comparison.

According to D. K. Clark, the grate being 1, the following proportions have been found to answer in practice for the fire spaces between the grate-bars:

| | |
|---|---|
| Plain cylinder boiler | 0.25 |
| Cornish boiler | 0.23 |
| French boiler | 0.34 |
| Tubular and flue boiler | 0.40 |

These numbers multiplied by the total area of the grate surface will give the total area of openings between the bars. For burning bituminous coal or wood it is usual to add openings to the amount of about one-thirty-sixth of the area of the grate by holes through the furnace doors. Such additional openings are sometimes placed behind the bridge to admit air enough to ignite the inflammable carbonic-oxide gas which, uninterrupted, would otherwise pass unconsumed up the chimney. Air is often forced by steam jets through holes immediately above the fuel, and is highly satisfactory.

The draft of a chimney-shaft or quantity of mixed gas which it discharges in a given time may be estimated either by weight or volume, or it may be expressed by means of the velocity of the current at some particular point, or by the pressure required to produce that current.

In designing the chimney of which we present a perspective view, sectional elevation and detail drawings, the quantity or volume of mixed gases capable of being discharged per hour and at the same time produce the most economical results has been calculated as follows:

The formula for estimating the velocity of the gases discharged from the shaft has been deduced by Weisbach and others as follows:

$$V = \sqrt{\frac{0.00367\ (T-t)\ 2\ gh}{1.044\ (30 + 0.05\frac{h}{d}}} =$$

$$0.477\sqrt{\frac{(T-t)\ hd}{30\ d + 0.05\ h}} \text{ feet per second.}$$

in which the coefficients of resistance to the passage of the gas through the furnace, flues and shaft are denoted by 30, 0.05 and 0.00367. $2\ g$ is twice the acceleration due to the force of gravity, and 1.044 represents the ratio of the density of the air within the chimney to that without. $T$ denotes the temperature of the gas in the chimney; $t$ that of the external air; $h$ the length of the air passage beginning at the fire-bars of the grate; $d$ the breadth of the chimney at its mouth.

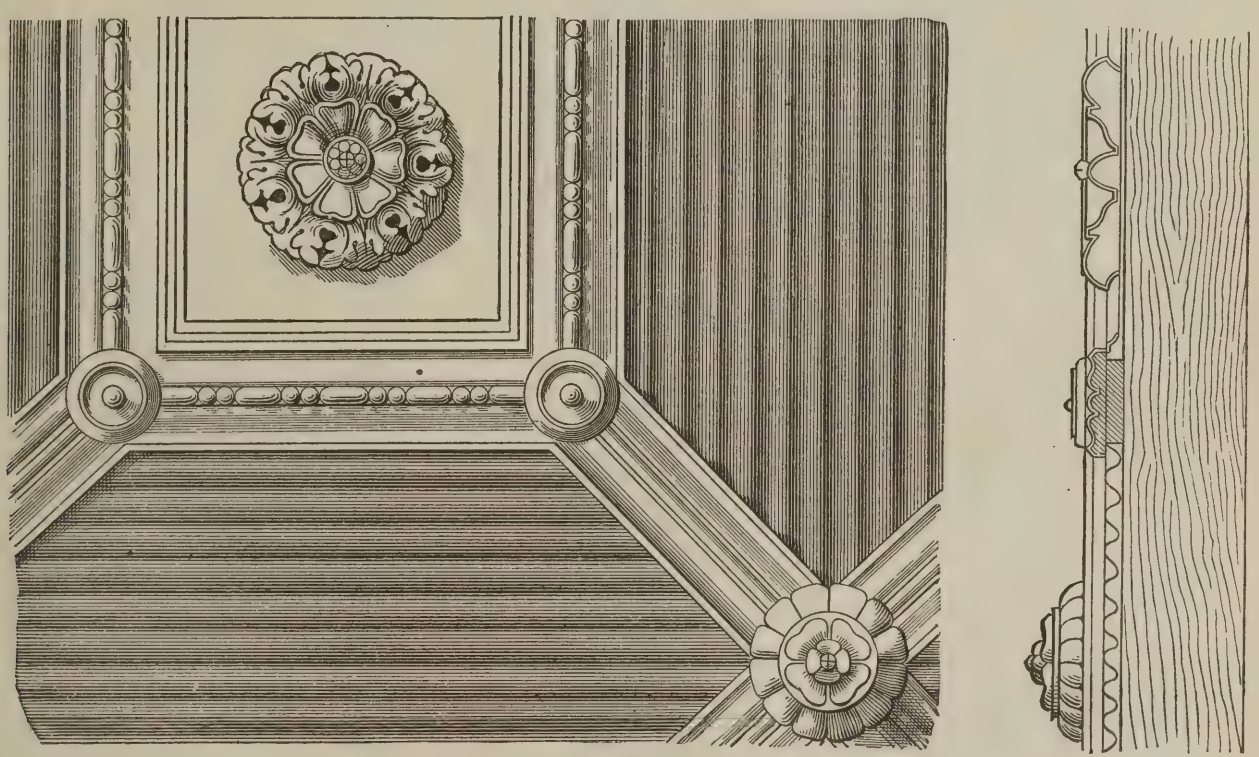
Let $T = 600°$ F., which is nearly that of the melting point of lead (608°); $t$ 60°, or the mean temperature of the external air; $2\ g = 64.4$; the flues are 100 feet in length and of the same area as the chimney, and the chimney passage itself above the grate-bars is 65 feet; therefore $h = 165$ feet, $d = 2$ feet 9 inches; hence by substitution

$$V = 1.0477\sqrt{\frac{(600 - 60)\ 165\ \times 2.75}{30 \times 2.75 + 0.05 \times 165}}$$

$= 24.79$ feet per second per square foot of section.

Now, the quantity of mixed gas discharged per second is equal to the product of the velocity by the area of the outlet. The area of the outlet is 7.5625 square feet. As an allowance has been made in the coefficients of resistance for the force which contracts the volume of discharge at the outlet, no further allowance is necessary; therefore we will have a total discharge of $24.79 \times 7.5625 = 187$ cubic feet per second, or 673,200 cubic feet per hour. As a discharge of 6000 cubic feet of mixed gas per hour is considered equivalent to 1 horse-power, we have $673{,}200 \div 6000 = 112$ horse-power, which is about 75 per cent. of the maximum horse-power of the chimney under natural draft economically managed.

The formula deduced by Professor Rankine for obtaining the velocity of the current is one of the simplest and best of which the

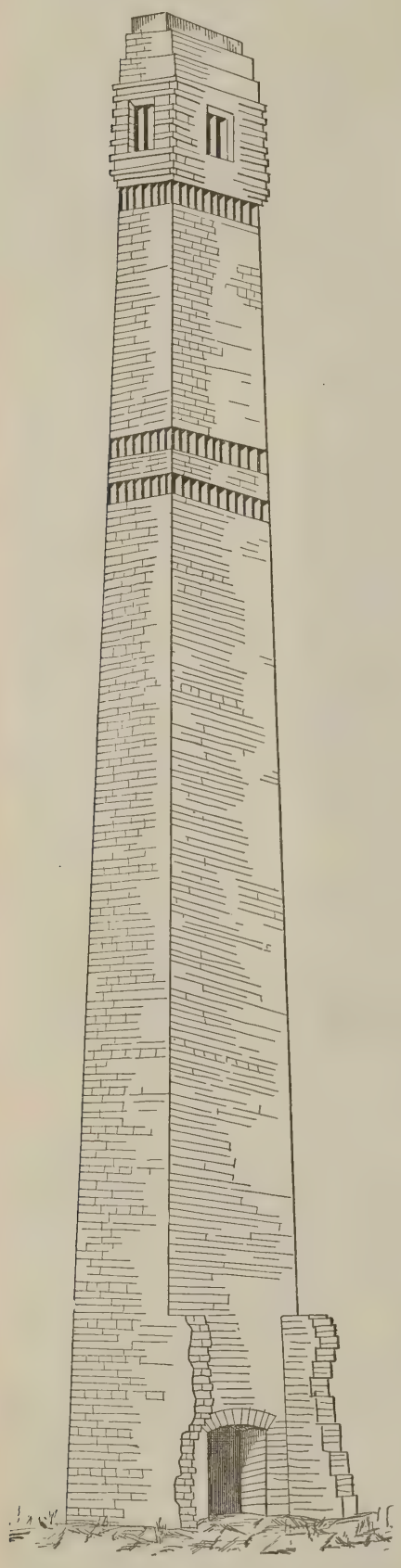


*Details of Construction of Sheet-Metal Ceiling.—Plan and Section.*

writer has knowledge. It affords with a slight calculation a ready and reliable method of ascertaining the most economical capacity of any chimney for any given weight of fuel consumed per hour upon the fire-grate. It is thus given:

$$V = \frac{W \times g \times t}{a \times V^1}$$

in which $W$ is the weight of fuel in



*Chimney Construction.—Fig. 1.—Perspective Sketch.*

pounds consumed in the furnace per second; $g$ is the quantity of air in cubic feet at 32° F., and $t$ is the absolute temperature of the gas discharged by the chimney, $a$ the sectional area in square feet of the mouth of the chimney, and $V^1$ the temperature of the freezing point reckoned from absolute zero. In the chimney before us, suppose the furnace consumes 1120 pounds of coal, or 10 pounds per horse-power, per hour, then $W = 0.311$ and $g = 300$; $t$ is $600 + 461.2° = 1061.2°$; $a$ is 7.5625 square feet, and $V^1 = 461.2° + 32° = 493.2°$ F.

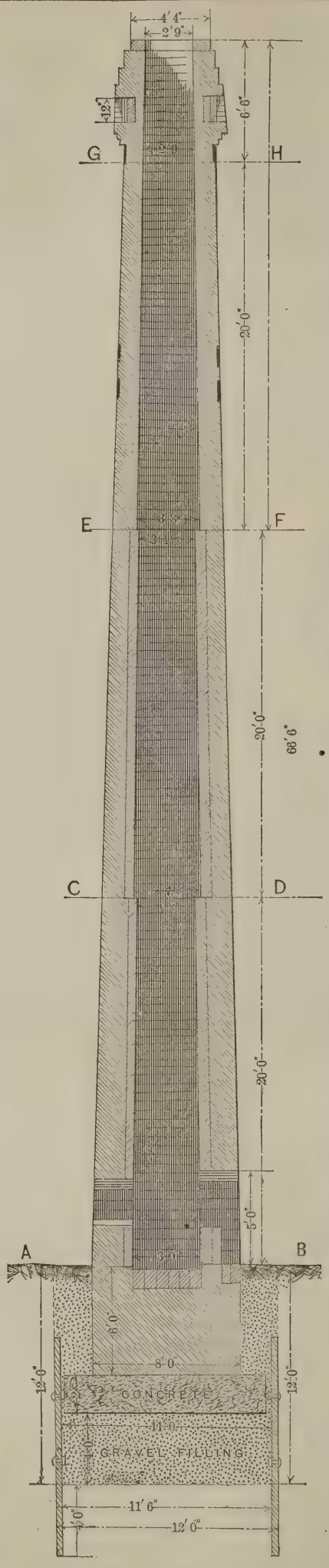



*Fig. 2.—Vertical Section.*

Then $$V = \frac{0.311 \times 300 \times 1061.2}{7.5625 \times 493.2} = 26.54$$

feet per second per square foot of section.

The coefficient of contraction for efflux is 0.93, which applied to the velocity obtained reduces it to 24.68 feet per second, which gives a total discharge of 186.6 cubic feet per second, and this is practically the same result as obtained by Weisbach's formula.

According to the method of calculation advanced by Mr. Thomas Box, the well-known writer on heat, we obtain the "head" of the chimney in inches of water to be 0.484 inch, and with the data that air at 60° is $\frac{1}{817}$ as heavy as water, and at 600° $\frac{1}{1865}$ time as heavy as water, we obtain, on the principle that the discharge of any pipe or system of pipes or apertures is proportional to the square root of the head, the horse-power of 109.6 or virtually 110, which agrees very closely with the result we first obtained.

The amount of air supplied to the furnace is of very great importance. If 24 pounds of air be supplied per pound of fuel the volume of air at 32° F. will be 300 cubic feet, and to find its volume $V$ at any other temperature $T$ we have

$$V = \text{volume at } 32° \text{ F.} \times \frac{T + 461.2}{493.2}$$

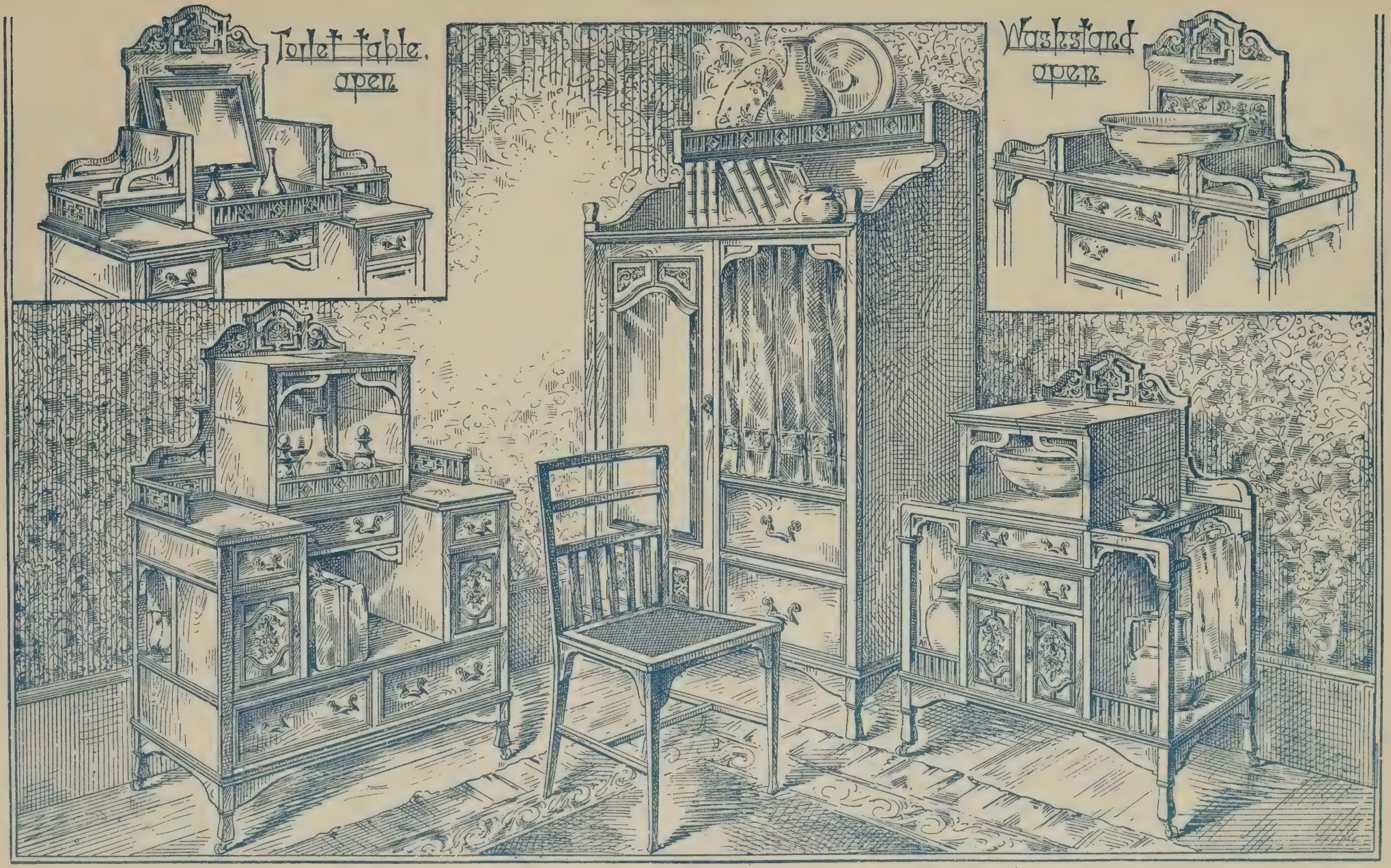
or $$\frac{300 \times (600 + 461.2)}{493.2} = 645 \text{ cubic feet.}$$

Using 1120 pounds of coal per hour at a volume at 645 cubic feet per pound, the total volume becomes 722,400 cubic feet for the theoretical volume. To ascertain the amount of air we have supplied the fuel with, we obtain from the proportion that the theoretical amount of air in pounds supplied per pound of fuel is to the total theoretical volume as the actual weight furnished per pound of fuel is to the actual volume. Therefore $24 : 722{,}400 :: x : 673{,}200 \therefore x = 22.3$ pounds of air per pound of fuel, or about 283 cubic feet. The difference is due largely to frictional resistances.

The best of ordinary boilers without especial contrivances for automatic feeding the fires consume about 15 pounds of coal per square foot of grate area, but by using the perforated double door suggested by Mr. C. W. Williams, and admitting air at a constant rate below the bituminous fuel to coke it, and air above to complete the combustion, and the admission of heated air behind the bridge wall, it has been found quite practicable to burn 25 pounds of coal per hour on a square foot of grate. The area of the perforations in the door should be one-thirty-sixth of the grate area. The total grate area necessary to obtain 112 horse-power would be $1120 \div 25 = 44.8$ square feet. From this data the boilers can be proportioned. When the fuel is spread over the grate in a layer from 10 to 12 inches in thickness the best results are obtained. The grate should slope downward from the furnace door to the fire bridge, about one in six. The clear hight of the bars above the floor of the ash-pit is 3 feet. The depth of a grate-bar in inches at the center should in general be about one and a half times the length of the bar in feet; for example, if a bar is 6 feet long its depth should be 9 inches.

(To be continued.)

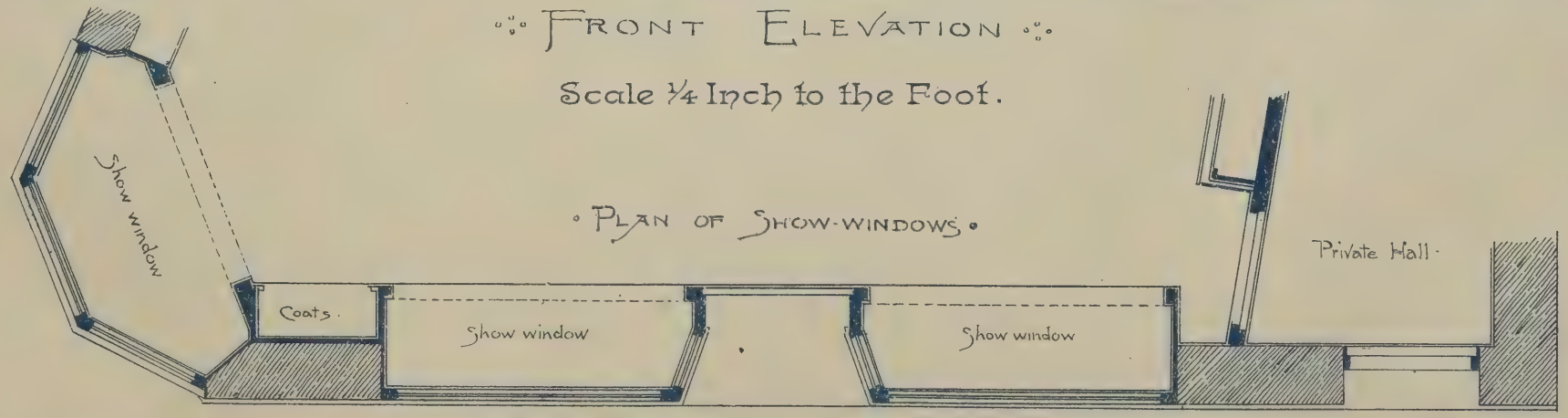
"Look here!" exclaimed Brown, entering the office of his architect; "you've made a nice mess of my house, haven't you?" "Why, what's the matter," replied the architect. "Matter," returned Brown; "why, the staircase is so crooked that I can't get my furniture up stairs, and there isn't a window in the parlor that you can look out of without using a step ladder." "Well, what of that? Doesn't your house look well from the street?" "It looks well enough; but, confound it, what does that amount to?" "Everything, my dear sir; everything. I understand my business, I believe; I am an architect. If you wanted a house that was only comfortable and convenient, why in thunder didn't you get a carpenter to draw the plans? Brown, I'm afraid you don't appreciate high art."




FURNITURE · FOR · THE · SPARE · ROOM.

FRONT ELEVATION

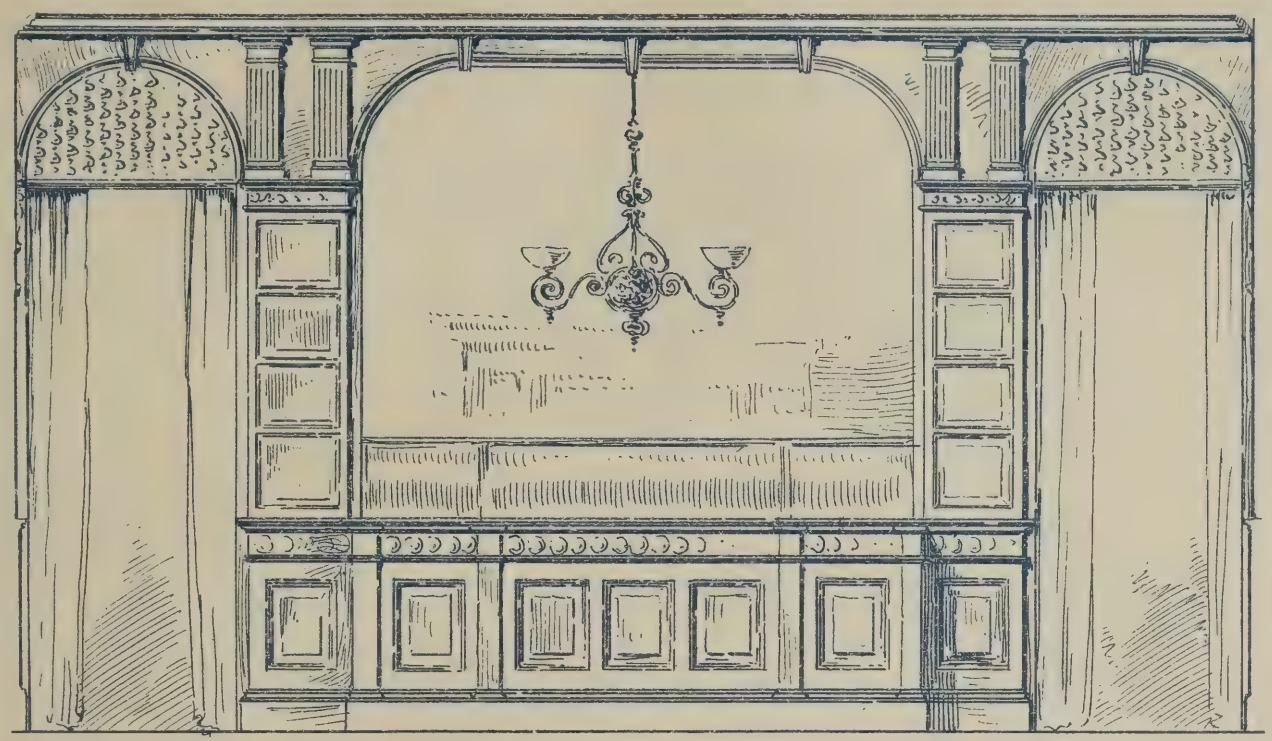
Scale ¼ Inch to the Foot.




PLAN OF SHOW-WINDOWS.

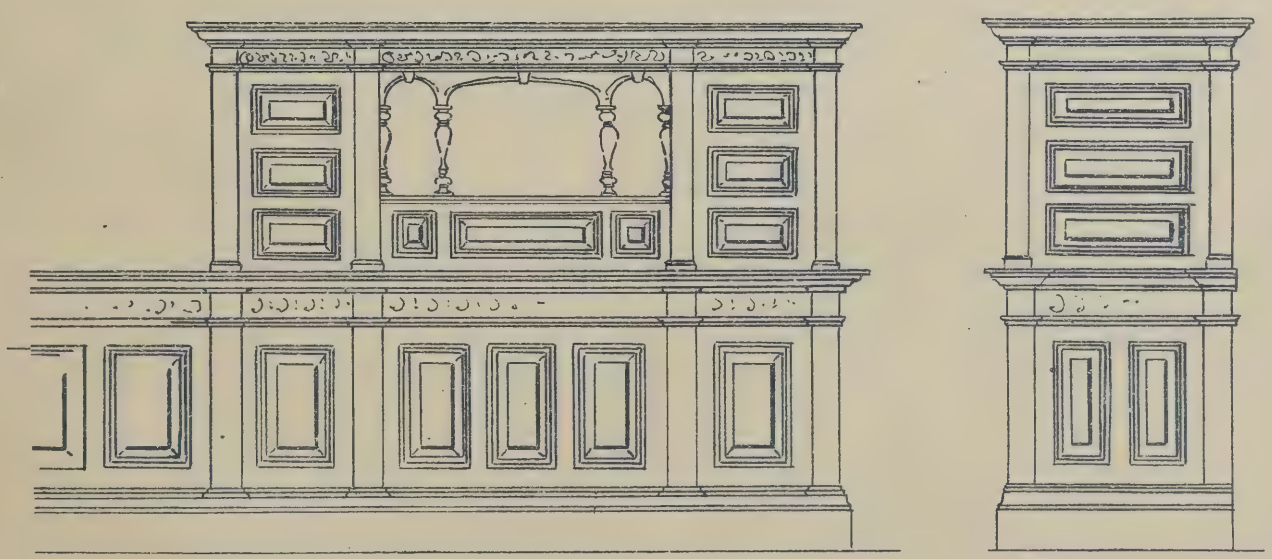
# DRUG · STORE · OF · JAMES · T. · KING,
## MIDDLETOWN, N.Y.

A.W. BRUNNER, Architect.



SCREEN FOR PRESCRIPTION DEP'M'T.
Scale 3/8 Inch to the Foot.

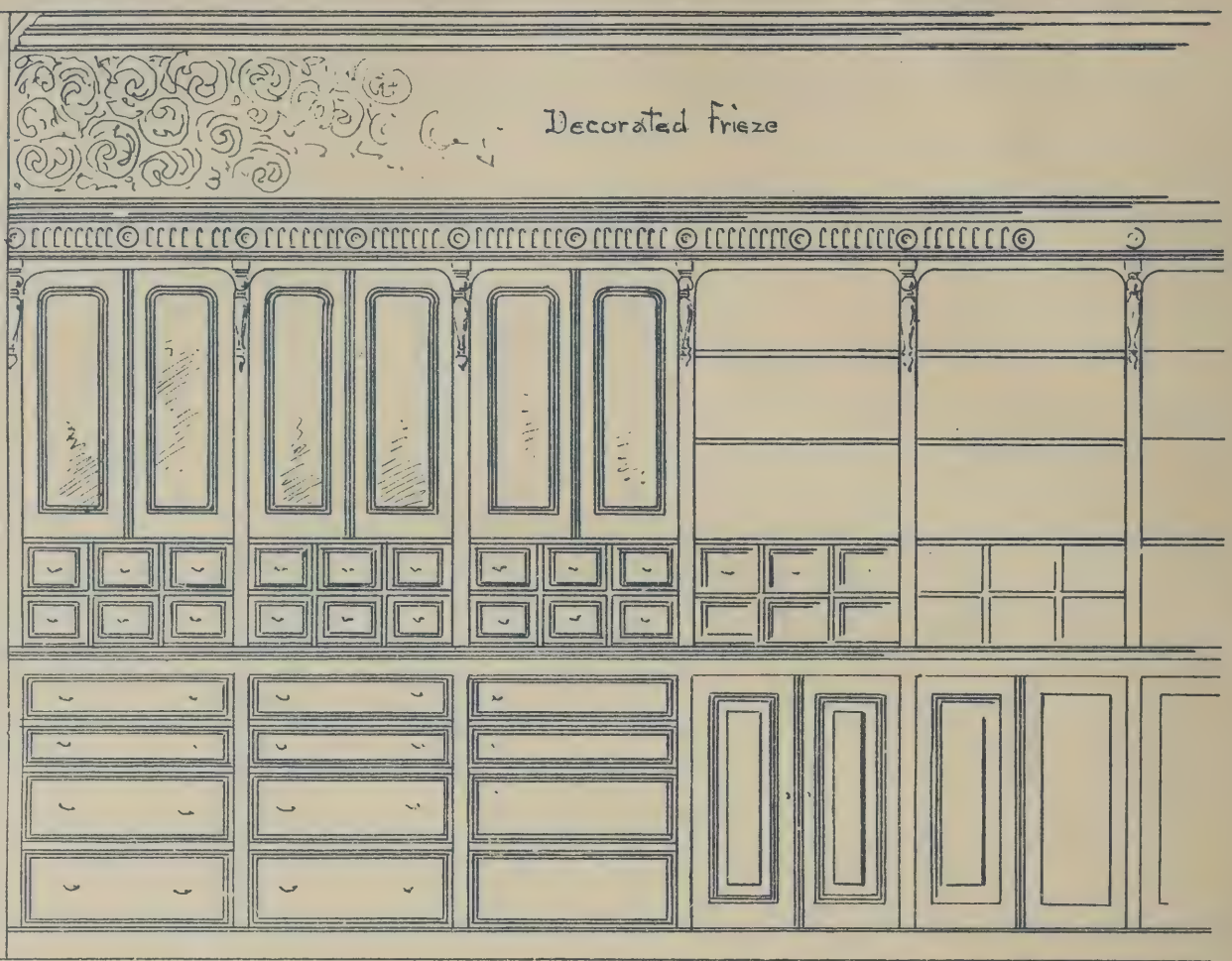
PLAN OF SCREEN



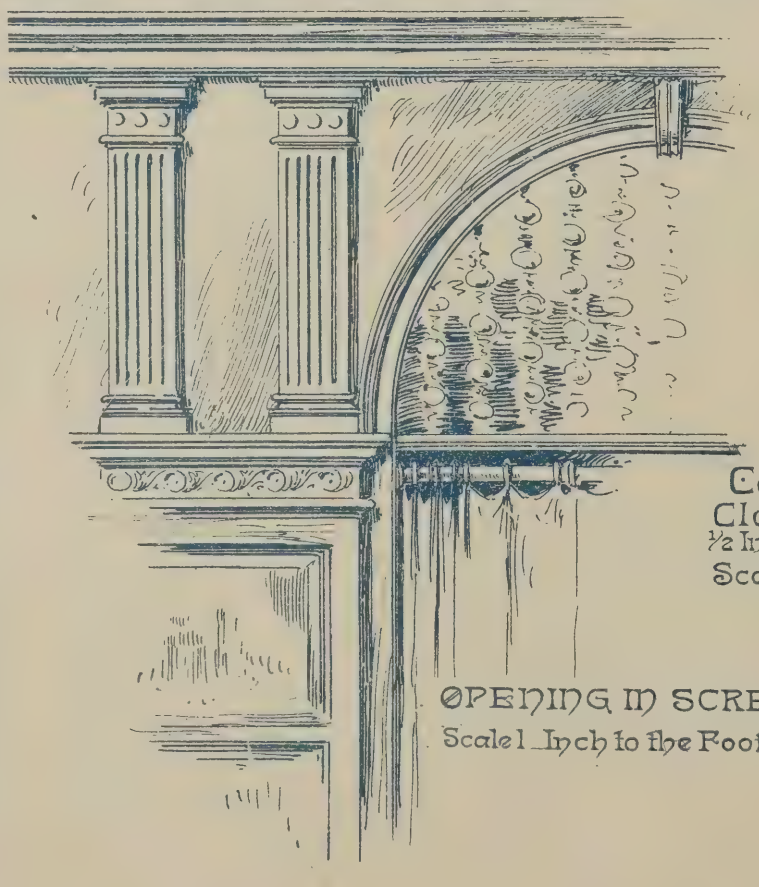
FRONT AND SIDE OF DESK. Scale 1/2 Inch to the Foot.

DETAILS OF FITTINGS OF DRUG STORE.
A.W. BRUNNER, Architect.

PLATE XL.

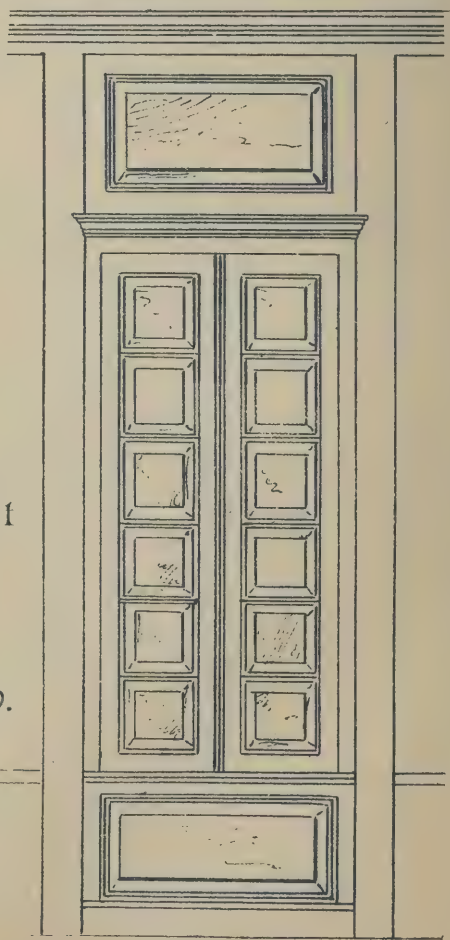



ELEVATION OF SHELVING, DRAWERS ETC. Scale ½ Inch to the Foot.



Coal Closet ½ Inch. Scale.

OPENING IN SCREEN.
Scale 1 Inch to the Foot.



# DETAILS OF FITTINGS OF DRUG STORE.

A. W. BRUNNER, Architect.

# CORRESPONDENCE.

### Builders' Estimate Blanks.

*From* "TABULA," *Connecticut.*—I send you a table for builders' use in calculating the joists that are required for floors in rooms of specified sizes. This particular table, as will be noticed by the heading, is calculated on the basis of 2 x 10 joists set 16 inches between centers, and with the ends extending into or resting on the walls 6 inches. The first horizontal line of figures at the top represents the number of joists in a given width, the width appearing in the next line below. Fractions of feet are given, for the reason that if set 16 inches between centers the figures indicate the exact width a given number of joists will occupy, allowing one joist on each side of the bay, as is always necessary in brick buildings. The first perpendicular column of figures represents the length of the joist, being 1 foot longer than the bay. The length of the bay is given in the second column. The column of figures at the extreme right of the table represents the number of feet, board measure, in one joist, and is useful in cases where additional joists are required. For example, it may be specified that every fifth, sixth, seventh or eighth joist is to be set double. Accordingly this column furnishes the data for estimating the additional material.

In using the table I proceed as follows: I have the architect's plan lying before me; I place my rule upon one of the rooms or I take the dimensions as they are figured in the drawing. For example, I find the dimensions of a single room to be 30 x 28 feet; allowing for the length to rest upon the walls, this would give me 31 feet in the first perpendicular column of the table, and 28 feet 2 inches in the second horizontal column, this dimension being the nearest to 28 feet. I follow the horizontal column above indicated to the intersection of the vertical column named, and there find 1136⅔ feet, the board measure of the joists required in the floor of the room in question. I proceed in this manner throughout the plan. Another example may be cited: How many joists will be required in a bay 20 feet long, 24 feet 2 inches wide? Above the width of the bay will be found the number of joists, namely, 19. By finding the intersection of the perpendicular and horizontal lines corresponding to the dimensions given it will be seen that the required number of joists figure 665 feet, board measure. This suggests another use that may be made of the table. What is the board measure of 16 joists 24 feet long? By finding the intersection of the vertical column having 16 at the top and the horizontal column opposite 24 feet we find 640 feet the board measure of the quantity of material named.

TABLE OF NUMBER OF JOISTS AND NUMBER OF FEET OF 2 x 10 INCH JOISTS IN GIVEN WIDTH AND LENGTH OF BAY, SET 16 INCHES BETWEEN CENTERS.

*Allowance is made for 6 inches at each end to rest in the wall, and one joist at each side of bay.*

| Length of joist. | L'gth of bay. | Number of joists. / Width of bay. 4 / 4' 2" | 5 / 5' 6" | 6 / 6' 10" | 7 / 8' 2" | 8 / 9' 6" | 9 / 10' 10" | 10 / 12' 2" | 11 / 13' 6" | 12 / 14' 10" | 13 / 16' 2" | 14 / 17' 6" | 15 / 18' 10" | 16 / 20' 2" | 17 / 21' 6" | 18 / 22' 10" | 19 / 24' 2" | 20 / 25' 6" | 21 / 26' 10" | 22 / 28' 2" | 23 / 29' 6" | 24 / 30' 10" | No. of feet in each additional joist. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 4 | 33⅓ | 41⅔ | 50 | 58⅓ | 66⅔ | 75 | 83⅓ | 91⅔ | 100 | 108⅓ | 116⅔ | 125 | 133⅓ | 141⅔ | 150 | 158⅓ | 166⅔ | 175 | 183⅓ | 191⅔ | 200 | 8⅓ |
| 6 | 5 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 | 210 | 220 | 230 | 240 | 10 |
| 7 | 6 | 46⅔ | 58⅓ | 70 | 81⅔ | 93⅓ | 105 | 116⅔ | 128⅓ | 140 | 151⅔ | 163⅓ | 175 | 186⅔ | 198⅓ | 210 | 221⅔ | 233⅓ | 245 | 256⅔ | 268⅓ | 280 | 11⅔ |
| 8 | 7 | 53⅓ | 66⅔ | 80 | 93⅓ | 106⅔ | 120 | 133⅓ | 146⅔ | 160 | 173⅓ | 186⅔ | 200 | 213⅓ | 226⅔ | 240 | 253⅓ | 266⅔ | 280 | 293⅓ | 306⅔ | 320 | 13⅓ |
| 9 | 8 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 | 285 | 300 | 315 | 330 | 345 | 360 | 15 |
| 10 | 9 | 66⅔ | 83⅓ | 100 | 116⅔ | 133⅓ | 150 | 166⅔ | 183⅓ | 200 | 216⅔ | 233⅓ | 250 | 266⅔ | 283⅓ | 300 | 316⅔ | 333⅓ | 350 | 366⅔ | 383⅓ | 400 | 16⅔ |
| 11 | 10 | 73⅓ | 91⅔ | 110 | 128⅓ | 146⅔ | 165 | 183⅓ | 201⅔ | 220 | 238⅓ | 256⅔ | 275 | 293⅓ | 311⅔ | 330 | 348⅓ | 366⅔ | 385 | 403⅓ | 421⅔ | 440 | 18⅓ |
| 12 | 11 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 340 | 360 | 380 | 400 | 420 | 440 | 460 | 480 | 20 |
| 13 | 12 | 86⅔ | 108⅓ | 130 | 151⅔ | 173⅓ | 195 | 216⅔ | 238⅓ | 260 | 281⅔ | 303⅓ | 325 | 346⅔ | 368⅓ | 390 | 411⅔ | 433⅓ | 455 | 476⅔ | 498⅓ | 520 | 21⅔ |
| 14 | 13 | 93⅓ | 116⅔ | 140 | 163⅓ | 186⅔ | 210 | 233⅓ | 256⅔ | 280 | 303⅓ | 326⅔ | 350 | 373⅓ | 396⅔ | 420 | 443⅓ | 466⅔ | 490 | 513⅓ | 536⅔ | 560 | 23⅓ |
| 15 | 14 | 100 | 125 | 150 | 175 | 200 | 225 | 250 | 275 | 300 | 325 | 350 | 375 | 400 | 425 | 450 | 475 | 500 | 525 | 550 | 595 | 600 | 25 |
| 16 | 15 | 106⅔ | 133⅓ | 160 | 186⅔ | 213⅓ | 240 | 266⅔ | 293⅓ | 320 | 346⅔ | 373⅓ | 400 | 426⅔ | 453⅓ | 480 | 506⅔ | 533⅓ | 560 | 586⅔ | 613⅓ | 640 | 26⅔ |
| 17 | 16 | 113⅓ | 141⅔ | 170 | 198⅓ | 226⅔ | 255 | 283⅓ | 311⅔ | 340 | 368⅓ | 396⅔ | 425 | 453⅓ | 481⅔ | 510 | 538⅓ | 566⅔ | 595 | 623⅓ | 651⅔ | 680 | 28⅓ |
| 18 | 17 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 | 630 | 660 | 690 | 720 | 30 |
| 19 | 18 | 126⅔ | 158⅓ | 190 | 221⅔ | 253⅓ | 285 | 316⅔ | 348⅓ | 380 | 411⅔ | 443⅓ | 475 | 506⅔ | 538⅓ | 570 | 601⅔ | 633⅓ | 665 | 696⅔ | 728⅓ | 760 | 31⅔ |
| 20 | 19 | 133⅓ | 166⅔ | 200 | 233⅓ | 266⅔ | 300 | 333⅓ | 366⅔ | 400 | 433⅓ | 466⅔ | 500 | 533⅓ | 566⅔ | 600 | 633⅓ | 666⅔ | 700 | 733⅓ | 766⅔ | 800 | 33⅓ |
| 21 | 20 | 140 | 175 | 210 | 245 | 280 | 315 | 350 | 385 | 420 | 455 | 490 | 525 | 560 | 595 | 630 | 665 | 700 | 735 | 770 | 805 | 840 | 35 |
| 22 | 21 | 146⅔ | 183⅓ | 220 | 256⅔ | 293⅓ | 330 | 366⅔ | 403⅓ | 440 | 476⅔ | 513⅓ | 550 | 586⅔ | 623⅓ | 660 | 696⅔ | 733⅓ | 770 | 806⅔ | 843⅓ | 880 | 36⅔ |
| 23 | 22 | 153⅓ | 191⅔ | 230 | 268⅓ | 306⅔ | 345 | 383⅓ | 421⅔ | 460 | 498⅓ | 536⅔ | 575 | 613⅓ | 651⅔ | 690 | 728⅓ | 766⅔ | 805 | 843⅓ | 881⅔ | 920 | 38⅓ |
| 24 | 23 | 160 | 200 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 520 | 560 | 600 | 640 | 680 | 720 | 760 | 800 | 840 | 880 | 920 | 960 | 40 |
| 25 | 24 | 166⅔ | 208⅓ | 250 | 291⅔ | 333⅓ | 375 | 416⅔ | 458⅓ | 500 | 541⅔ | 583⅓ | 625 | 666⅔ | 708⅓ | 750 | 791⅔ | 833⅓ | 875 | 916⅔ | 958⅓ | 1,000 | 41⅔ |
| 26 | 25 | 173⅓ | 216⅔ | 260 | 303⅓ | 346⅔ | 390 | 433⅓ | 476⅔ | 520 | 563⅓ | 606⅔ | 650 | 693⅓ | 736⅔ | 780 | 823⅓ | 866⅔ | 910 | 953⅓ | 996⅔ | 1,040 | 43⅓ |
| 27 | 26 | 180 | 225 | 270 | 315 | 360 | 405 | 450 | 495 | 540 | 585 | 630 | 675 | 720 | 765 | 810 | 855 | 900 | 945 | 990 | 1,035 | 1,080 | 45 |
| 28 | 27 | 186⅔ | 233⅓ | 280 | 326⅔ | 373⅓ | 420 | 466⅔ | 513⅓ | 560 | 606⅔ | 653⅓ | 700 | 746⅔ | 793⅓ | 840 | 886⅔ | 933⅓ | 980 | 1,026⅔ | 1,073⅓ | 1,120 | 46⅔ |
| 29 | 28 | 193⅓ | 241⅔ | 290 | 338⅓ | 386⅔ | 435 | 483⅓ | 531⅔ | 580 | 628⅓ | 676⅔ | 725 | 773⅓ | 821⅔ | 870 | 918⅓ | 966⅔ | 1,015 | 1,063⅓ | 1,111⅔ | 1,160 | 48⅓ |
| 30 | 29 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1,000 | 1,050 | 1,100 | 1,150 | 1,200 | 50 |
| 31 | 30 | 206⅔ | 258⅓ | 310 | 361⅔ | 413⅓ | 465 | 516⅔ | 568⅓ | 620 | 671⅔ | 723⅓ | 775 | 826⅔ | 878⅓ | 930 | 981⅔ | 1,033⅓ | 1,085 | 1,136⅔ | 1,188⅓ | 1,240 | 51⅔ |

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### Painting Contract.

*From* C. A. M., *Montclair, N. J.*—Will you kindly express an opinion on the following: I entered into a contract to paint a new house to be completed May 1, 1886. The contract was signed and witnessed December 22, 1885. The owner stopped the job to suit himself. Is the contract made void or broken by this means?

*Answer.*—The contractor's position, under the circumstances named, depends in some measure upon the terms of the contract. Our correspondent has neglected to send us a copy of the document, and therefore we do not know what rights the owner may have reserved to himself with reference to the stoppage of the work if for any reason he found it necessary to do so. Assuming that by the stoppage of the work the owner has violated rights of the contractor, in all probability the contractor's measure of damages is simply the loss of the profit he would have made had he been permitted to do the work. This it is probable he could obtain by a suit. Answering our correspondent's question more specifically, it is hardly to be supposed that one party to a contract can break it or make it void simply to suit his own convenience or to further his own interest. This remark applies to contracts in general. In building contracts, however, reservations are frequently made looking to delays in the work on the part of different contractors. If our correspondent had sent us a copy of the contract we would have been in a better position to answer his questions. On the face of it, it would seem that he had a claim for damages.

### Trouble with a Driven Well.

*From* F. S. *Flora, Ind.*—I inclose a sketch of a driven well which has been the source of great annoyance to the owner. When a child gets into trouble its first impulse is to run to its mother for advice, and as *Carpentry and Building* is the good mother to us all I lay before it my complaint. The well is driven 42 feet, using 2-inch galvanized iron pipe, with screen on the bottom. The water rises to within 4 inches of the top of the pipe. The bottom end rests in a bed of quicksand so fine that it passes through the "Roush" point and discolors the water. Attached to the bottom of the pump is a 1¼-inch pipe which is 16 feet long and goes down on the inside of the larger pipe. There is also a screen on that. The pump is run by a Perkins' windmill. The owner says that under the most favorable circumstances three to five barrels of water is the full delivery per day. I have suggested taking the pump out and then pushing a very fine sponge down the pipe to a point just above the screen, and to make a copper tube which would nicely fit the inside of the pipe, put a bottom in it and a permanent wire bail on the top, so that it can be moved in case of necessity: push this down on the top of the sponge and fill it with clean coarse gravel. Before replacing the pump remove the screen and leave the end of the 1¼-inch pipe open. I neglected to say above that I propose to perforate the copper tube.

*Note.*—We have not thought it necessary to reproduce our correspondent's sketch, for it conveys nothing in addition to what is explained in his letter. The difficulty with which he seems to be contending is the presence of fine sand in the pipe and inferentially interfering with the valves of the pump. Some such plan as he proposes will in all probability answer a good purpose, but there is nothing like testing it in order to ascertain its relative efficacy. Our opinion with so few of the circumstances narrated cannot be of much advantage. We do not like the idea of the main pipe being open at the top, and it is possible that the flow of water into the lower pipe is not rapid enough to keep the supply up to the hight named. In other words, it is possible that the pump lowers the water so rapidly in the main pipe that for a good portion of the time it is pumping air. This would be remedied, possibly, by extending the pump-pipe further down, or by making a close connection between the pump-pipe and the main pipe. This suggestion is independent of the means for overcoming the sand. We do not see any special advantage in the use of gravel in the sand arrester which our correspondent describes. Whatever sand passes the sponge would not be interrupted n its course by the presence of gravel. The sponge, if used, should be arranged in such a way as to make it possible to easily remove it for cleaning.

### A Hint for Chimney Builders.

*From* D. L. M., *Union City, Mich.*—I have an idea that I desire to lay before the chimney builders among the readers of *Carpentry and Building.* A large house was built in this neighborhood some time since in which the chimney for the furnace did not work well from the start. It began leaking creosote and giving trouble generally. Finally it was cut into and the discovery was made that a brick had fallen during the time it was being built, and had

lodged in just such a way as to obstruct the flue. Mortar had accumulated above it, so nearly closing the flue as to destroy the draft. Now the suggestion that I have to make to the chimney builders is this: If on completion of a chimney a bat is lowered down the flues by a rope, obstructions of this kind would be discovered so as to be remedied before leaving the work. A little precaution of this kind will save a great deal of trouble.

### Joining Level and Rake Cornices.

*From* M. W. S., *Randolph, N. Y.*—If some reader of *Carpentry and Building* will explain how to miter the cornice of a dormer with a level cornice he will confer a favor. I do not remember having seen anything of this kind in print in *Carpentry and Building*. If it has been presented I have forgotten it.

*Note.*—We have given rules for accomplishing such joints as our correspondent refers to on several occasions since we have been publishing *Carpentry and Building*. Among others, refer to page 189, September number for 1883. We are disposed to refer the question to our readers, with the suggestion that if any one has anything new or particularly desirable on this subject we shall be glad to see it with a view to publication. We do not care to repeat what we have already published.

### Split Roofing Nails.

*From* W. & R., *Kansas City, Mo.*—We desire to learn who manufactures a roofing nail made of soft iron, the shank of which is split and which in driving into the wood curls or clinches. We have seen samples of the nail, but do not remember where it is manufactured. If any one can give the information we shall be glad to have it.

*Note.*—We are unable to furnish the information that our correspondents desire, and therefore refer the question to our readers. It is possible that the nail is not in the market. In that case our correspondents may serve their interests by using a barbed wire nail. Wire nails have the advantage of a very flat head, and the shank has a very firm hold upon the wood into which it is driven.

### Perry's Hand-Railing.

*From* W. E. PERRY, *No. 75 Peel street, Derby, England.*—A copy of *Carpentry and Building* for May has fallen into my hands. I find that the subject of hand-railing is still engaging the attention of some of your readers. The question that seems to interest

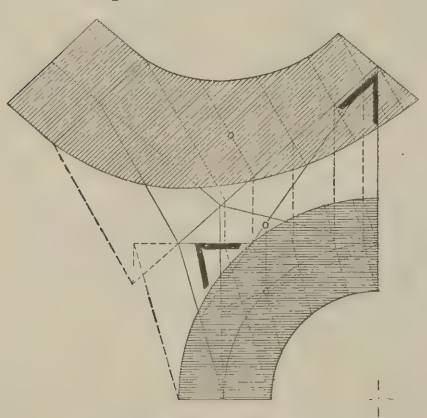
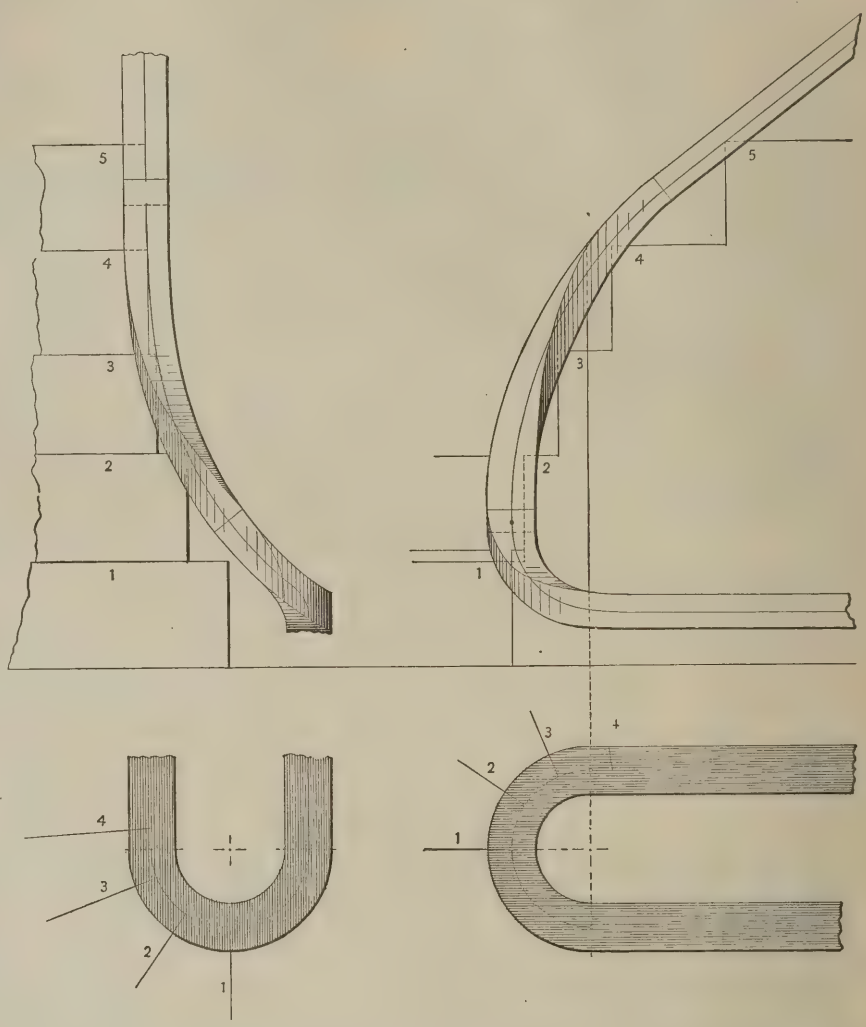


*Fig. 2.—Illustrating How the Face Molds and Bevels are Obtained from Three Resting Points, and the True Pitch of the Tangents.*

some of them is whether the tangent system represents the highest state of the art, or, as one of your correspondents puts it, "something better is still wanted, and for such a system of construction we are still waiting patiently." I have had 30 or 40 years' experience in hand-railing construction; accordingly I may be allowed to state my opinion, and that is there is something better than the tangent system. I was taught the square cut and tangent sytem under Mr. J. Weston in 1849. In 1854 I gave my own system to the public. I threw away as insufficient the method I had been taught.

To those of your readers who may be unacquainted with the system that I have practiced up to the present time I will briefly state that I first draw the plan of the stairs




*Perry's Hand-Railing.—Fig. 1.—Elevation of Hand-Rail, Showing Its Twisted Appearance and Its Relation to the Plan in Two Different Views.*

to an inch scale. I set up the elevation of the central falling line of the hand-rail, which I endeavor to make as pleasing to the eye as the circumstances of the case will admit. The face mold is obtained from three resting points (*vide* P. Nickolson) through which the plank plane is to pass, the tangents and the bevels following as a matter of course. The tangents are made subservient to the curve of the rail, which is the point first decided upon. All the joints are made butt to the curve of the rail, and not necessarily to the tangents. I may here state that I have never had a failure, and can confidently recommend the plan to all those who have brains and are desirous of something better than the incipient tangent system, miscalled. I have not much inclination for writing at the present time, but I inclose one of my old drawings which may be of interest to your readers. I was introduced to Mr. Riddel when in England, and I am well acquainted with his system. I have a copy of his work by me as I write.

*Note.*—The accompanying engravings have been made from drawings inclosed with Mr. Perry's communication. They are entitled "A Study Paper, Intended for Private Instruction." In Fig. 1 an end and side elevation of a hand-rail are presented, showing its twisted appearance, and conveying to the mind an idea of its real character. In Fig. 4 corresponding elevations are presented which show the method of setting up the falling line of the rail in the elevation and the development or stretchout of same. Figs. 2 and 5 show how the face molds and bevels are obtained from three resting points, and the true pitch of the tangents. Figs. 3 and 6 represent triangular solids, and show the trace of the cylinder on the oblique plane, also the sections containing the plumb bevels.

### Arrangement of Rooms.

*From* W. H W., *Jacksonville, Fla.*—I desire to offer a few remarks with reference to the arrangement of rooms presented by Mr. King in the August number of *Carpentry and Building*. The first thing that is particularly striking is the wonderful extravagance in useless and ugly hall space. On the first floor the staircase is placed directly

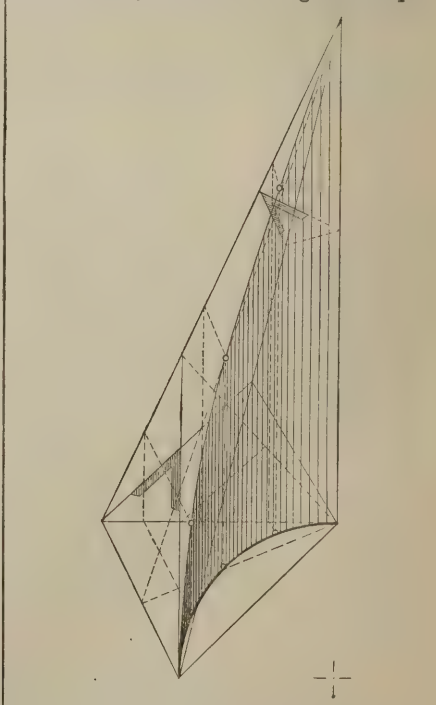


*Fig. 3.—Solid, Showing the Trace of a Cylinder on the Oblique Plane; also the Sections Containing the Plumb Bevels.*

in the way of view and ventilation to the sitting-room. The sitting-room, instead of being cool, has the appearance of being stuffy, particularly in the summer and autumn. I have no doubt the room would be comfortable in the winter time. The sitting-room should be the most cheerful room in the house, but two hallways, a closet under the stairs and a bathroom door intervening between the sitting-room windows and the windows of the outer walls are features decidedly depressing. Of a wet day, when one would feel disposed to be indoors and yet wanting to look out of windows, the prospect would be painfully marred if it was by any chance visible at all.

Referring to the plans presented some months since by Mr. J. Q. Ingham, I would say that the conditions there are different, because people generally use a bedroom for sleeping purposes, and the view from it is therefore a secondary consideration. On the other hand, the view from a sitting-room is a primary consideration. I feel that the situation of the sitting-room in Mr. King's plan would be an obstacle in renting the house. The position of the staircase in Mr. King's design is bad. Unless the house be a mansion, in which the staircase can be open in its construction, and approached from a spacious hall, it should be placed in a less prominent position, for under any circumstances a staircase, taken simply as such, is not beautiful, and it is only made pleasing to the architectural or artistic eye by being judiciously located. In a small dwelling, such as under consideration, it would be infinitely better to relegate it to some place in the vicinity of the bathroom, where it could start with an ornamental newel, with a lamp which would be somewhat attractive in appearance, and thereby escape being what it is now, a decided eyesore. As for the rest of the first floor and the whole of the second floor, they speak for themselves. A person having a limited space to work upon, irrespective of funds, would no doubt hesitate ere he employed the plans shown.

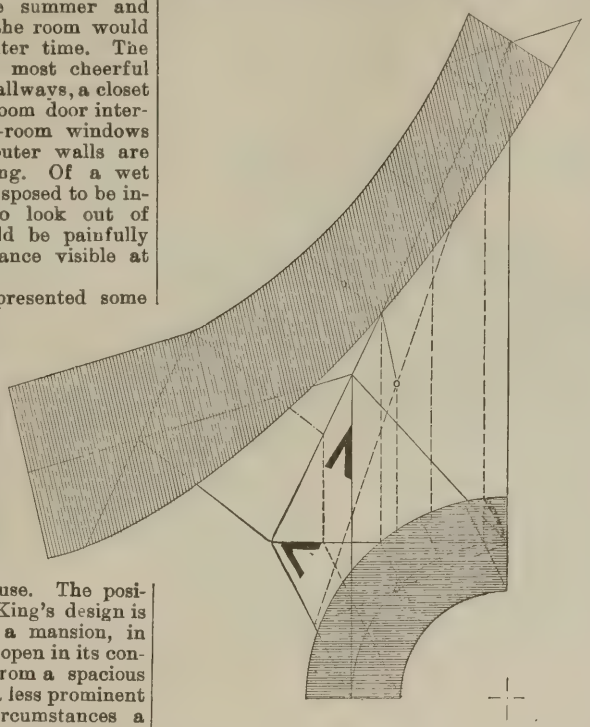


*Fig. 5.—Illustrating How the Face Molds and Bevels Are Obtained from Three Resting Points, and the True Pitch of the Tangents.*

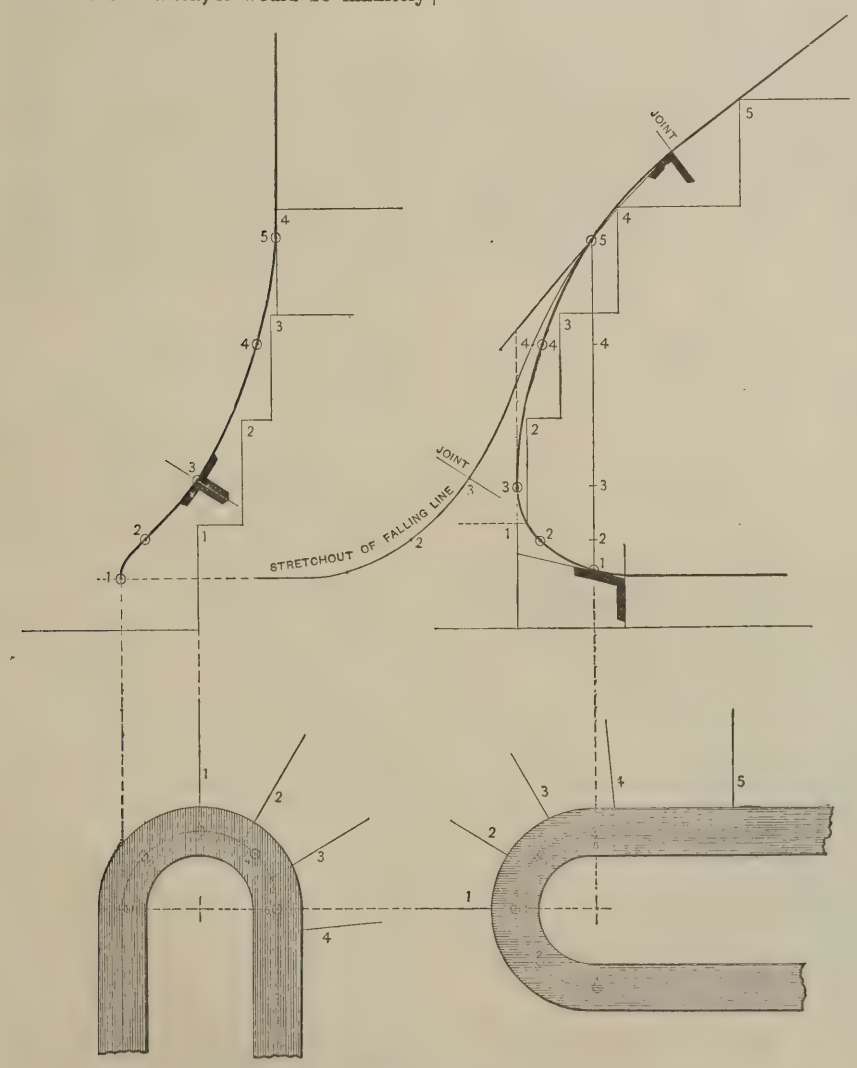



*Fig. 4.—Elevations Showing the Method of Setting Up the Falling Line of Rail in Elevation, and the Development or Stretchout of the Same.*

### Hemacite.

*From* G. H. B., *Detroit, Mich.*—Please give definition of word "hemacite," the material used for door-knobs, &c., and state if the word appears in any dictionary.

*Answer.*—If our correspondent will refer to *Carpentry and Building* for April, 1879, he will find a description of hemacite, its manufacture, use and qualities. The principal constituent of hemacite is bullocks' blood. We reprint below from the article referred to a brief description of the process of its manufacture: "The idea of utilizing bullocks' blood is one of striking originality, and yet it has been shown by Dr. W. H. Dibble, of Elizabeth, N. J., after a long series of experiments, consuming much time, that finely-finished articles could be made from bullocks' blood alone, or from this material deprived of its albumen. The products of these earlier experiments, though exhibiting many qualities of merit, lacked the strength to insure for them the wide range of utility which in other respects seemed to be open to them. Dr. Dibble therefore continued his efforts, and found that when bullocks' blood was mixed with certain finely comminuted mineral or vegetable substances, singly or in combination, and the substances so obtained were reduced to a dry powder, such powder could, by subjecting it to a powerful chemical and mechanical action simultaneously, be molded into a great variety of useful and ornamental articles, and that the articles so made would possess qualities of beauty, strength, finish and sharpness of outline." Goods from this material are at present made by the Dibble Mfg. Company, Trenton, N. J. Our correspondent asks for the definition of the word "hemacite," and perhaps the information we have furnished is entirely superfluous. The word, so far as we know, is not to be found in dictionaries. The root of the word is evidently the Greek *haima*, meaning blood, though what the suffix is derived from we do not know, unless it may be the Greek word *sitos*, meaning wheat. Perhaps this cereal is one of the constituents of hemacite.

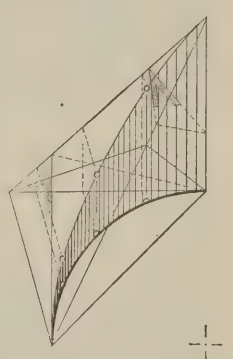


*Fig. 6.—Solid, Showing the Trace of a Cylinder on the Oblique Plane; also the Sections Containing the Plumb Bevels.*

### Hanging Glass Doors.

*From* L. W. F., *Syracuse.*—I desire to learn, through *Carpentry and Building*, the correct way of hanging a common four-light sash door. Should it be hung with the puttied side or the molded side out? I always hang such doors with the puttied side out, so that the water will run off and not get in back of the glass. I refer to common outside doors with an "O G" stuck on one side.

*Answer.*—This question has been up for discussion in our columns before, and has shown that there is no invariable rule in such matters. Some of our readers prefer one plan and some the other. It would seem that under ordinary circumstances the plan which our correspondent pursues is a very good one.

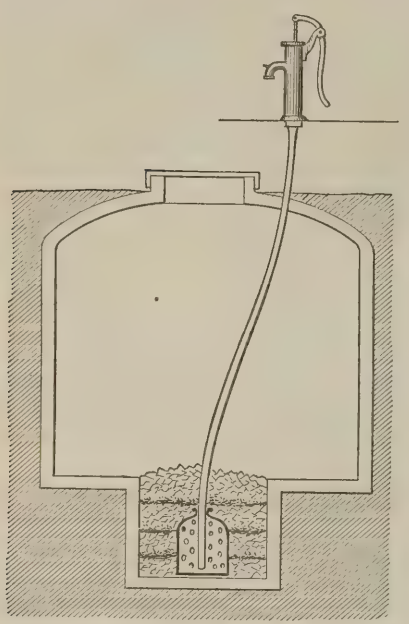
### Efflorescence on Brickwork.

*From* H. R. C., *Worcester, Mass.*—I have read with much interest the article entitled "Efflorescence on Brickwork," published in a recent issue of *Carpentry and Building*. I have a question which I would like to have answered through your columns by Mr. Anderson or some one else who is posted. If

the white substance on the face of brick-work, called magnesia, is contained in the mortar, why is it that it appears upon brick which mortar has never touched? A few days ago I examined a pile of pressed brick, and was surprised to find this substance on the face of some of the brick. I went so far as to taste it. So far as I can illustrate its characteristics it resembled saltpeter. I inquired of a well-informed mason about the substance, and he told me at once saltpeter. Under the circumstances I submit the question as above, and shall be very glad to have an answer.

### Filtering Cistern Water.

*From* E. A. V., *New York City.*—In reply to "J. S. R.," in regard to filtering water before pumping, I would say that if he will



*Filtering Cistern Water.—Sketch Accompanying Letter from E. A. V.*

dig a pit in the bottom of his present cistern 3 feet deep and 3 feet in diameter, brick and cement the sides and bottom tight, then take an old fashioned 2-gallon molasses jug, perforate it with small holes around the sides, place it in the center of the pit and run the pipe from the pump to it through the neck of the jug and fill in around it with good, clean charcoal and gravel to the top of the pit, he will have a good filter and one that will give perfect satisfaction. If the water is not filtered at all before entering the cistern the pit should be made deeper than described above, and coarse sand or very fine gravel should be used with the charcoal and coarse gravel. The inclosed sketch represents the idea and may be of advantage to your correspondent.

*From* W. F. T., *New York.*—During a residence north of this city some years ago, where the Croton water was not accessible, and where we were largely dependent for our water supply on our cistern—fed in the usual way from the shingle roof—the need of a filter was hourly made apparent by the variety of substances which the kitchen pump drew from the cistern aforesaid. A visiting friend suggested a home made filter designed by himself under similar circumstances, which I tried and which I found to work like a charm. Here is a copy of his "specification" *verbatim et literatim*, with the cost of the material:

| | |
|---|---|
| Purchased a clean whisky barrel..... | $1.00 |
| A bushel of Rockaway sand..... | .10 |
| A bushel ot white stone roofing pebbles..... | .25 |
| A bushel of charcoal..... | .25 |
| A wooden barrel faucet..... | .10 |
| A false wood bottom and cover to barrel..... | .25 |
| Total cost..... | $1.95 |

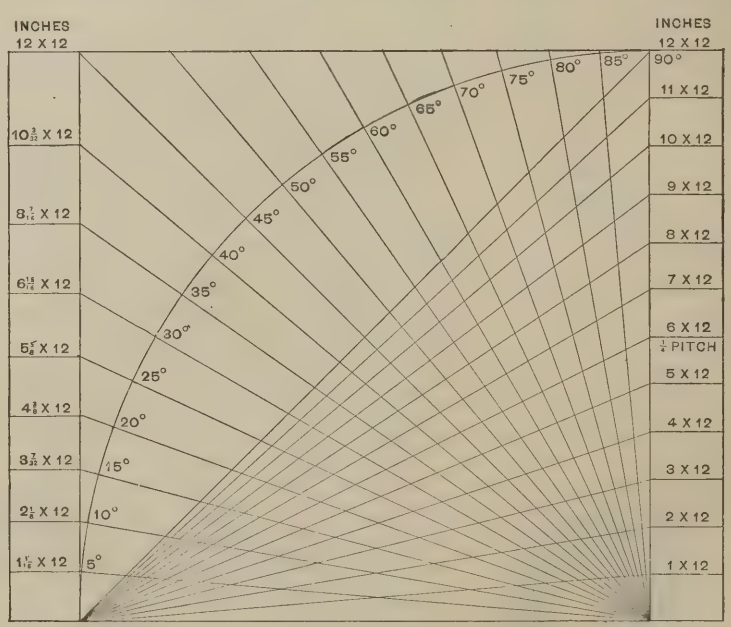
The false wood bottom was first perforated by 10 ½-inch holes and placed inside about 1 foot from the bottom proper. The upper side of this false bottom was covered first with a 1-inch layer of the small white roof pebbles, then a layer of the sand, then one of charcoal, which was repeated in the same order, making six layers, two of each of the materials. The barrel was then fixed in position off the kitchen. The necessary connection made between it, the cistern and the pump by which it was kept filled every morning, and for over 10 years that I resided in that house I had the satisfaction, through the aid of my home-made filter, of having a constant supply of filtered water as clear and sparkling as from a fountain.

### Pitched Treads.

*From* D. H. J., *Danielsonville, Conn.*—My attention has been called to the article regarding pitched treads by "C. P B." and the Editor's note appended. I am not a stair-builder as the term is generally understood, but I am a builder of houses, and in following my business have put in a great many flights of common stairs, with a few good front stairs. I find that the general demand is for easy flights, whether there is a run of 20 feet or of 5 feet. If I want to make an easy flight where the circumstances will not admit of it by other means I pitch the treads. A case in point may be mentioned for illustration. Some time since I had a flight to put up that led to a cellar. The owner wanted them as easy as they could be made for him, as he had a great deal of use for them. The treads employed were 9 inches wide and the risers 8½ inches high. I made the front of the tread ¼ inch lower than the back edge. The verdict was that the flight was the easiest in the house. This was a fair comparison, because there were two other flights of stairs in the house in question of the same general dimensions the treads of which were level.

### Getting Degrees with the Square.

*From* J. I. D., *Chicago, Ill.*—I inclose a diagram showing how to obtain the different angles in roofs with a steel square when they are given in degrees. The right-hand column gives the figures in inches to use on the square to get the different pitches; for example, if one-quarter pitch is wanted use 6 of the blade and 12 on the tongue. Others are to be similarly calculated. The left-hand column gives the angle in degrees from 5° to 90°; for example, if a pitch of 30° is required use 6 5/16 of the blade with 12 on the tongue. By reversing, 60° will be obtained. Others are to be obtained in the same way.




*Getting Degrees with the Square.—Sketch Accompanying Communication from J. I. D.*

### Straightening Twisted Doors.

*From* W. H. C., *Ansonia, Conn.*—Referring to the communication of "S. A. P.," of Pawtucket, R. I., in a recent issue of *Carpentry and Building*, it is not clear to me whether the door is twisted or that one or both of the stiles of the door are bent. I was once applied to to remedy a twisted door, which was new and finished in imitation of black walnut. Instead of discarding the door and procuring another I twisted it into the opposite position without even removing it from its place, and fastened and left it in that position for a week. When released it was in satisfactory shape, so the owner informed me. Whether it ever resumed its original twist I do not know. It is a common practice in door factories to straighten bent stiles by laying the ends on blocks with the bowing side up, and then force the door down in the center with a brace from the ceiling. Leaving the work in this position a few days remedies the difficulty.

## REFERRED TO OUR READERS.

### Laying Off Door Frames.

*From* C. F. L., *Clarksville, Tenn.*—I desire to see described in *Carpentry and Building* a good method of laying off door frames for doors with elliptical heads. If some practical reader of the paper will accommodate me in this respect he will confer a favor.

### Semi-Detached Brick House.

*From* F. T. S., *Bowmanville. Ont.*—I would like to see in *Carpentry and Building* some designs for semi-detached houses to be built of brick. The house should contain from six to nine rooms, and should cost from $1500 to $2500 per side. If any reader of the paper can furnish something of this kind he will confer a favor.

### Carpenter's Shop.

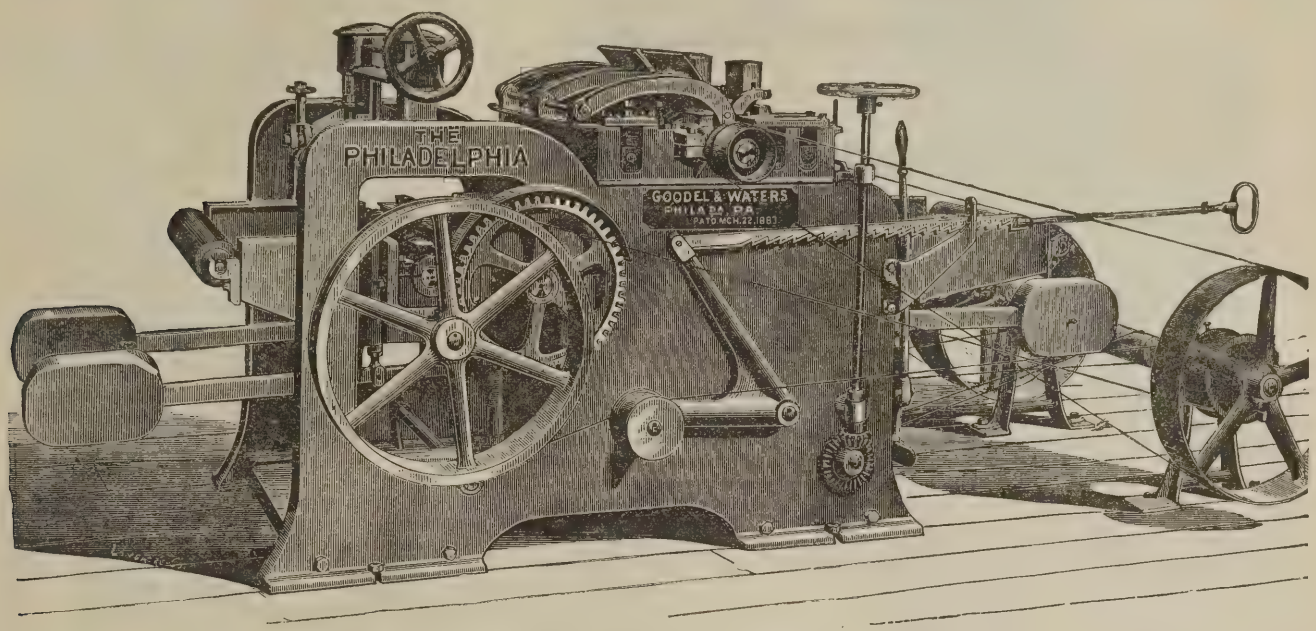
*From* C. N. M., *North Ridgeville, Ohio.*—I would like to see published in *Carpentry and Building* plans of a shop arranged with rip and cut-off saws, pony planer, lathe, &c. The shop should be arranged to handle lumber conveniently from 12 to 20 feet in length and to the best advantage. The motive-power should be a 6 to 8 horse power steam engine. The shop should be two stories high, the second story to be used for benches and storage.

*Note.*—The want that our correspondent describes is one that is experienced by a large number of contractors and builders, and accordingly some account of the shops that many of our sub-cribers are using would be of the greatest interest. We shall be glad to hear from our readers in answer to this question. It will give us pleasure to engrave such plans as may be sent in in response to this request.

# NOVELTIES.

### Double Surfacer and Jointer.

Messrs. Goodell & Waters, of Philadelphia, have brought out a new machine, which they have named the Philadelphia Endless Bed Double Surfacer and Jointer, a view of which is presented in Fig. 1 of the engravings. This machine, they inform us, is intended for all grades of heavy work, and is suitable for the various sizes of heavy timbers used in the construction of houses and other buildings. The machine is fitted with the latest improvements in planers, and also embodies several new and important features. It is made to work 26 or 30 inches wide, as may be ordered, and up to 12 inches thick, with upper and lower cylinder. By combining the jointing attachment the material may be surfaced on all four sides from 22 inches wide by 8 inches thick down to 4 inches wide by ¾ inch thick. A novel feature of the machine is the surfacing of two pieces of timber on three sides at one operation. This is accomplished by placing a guide between the jointer heads and running a piece of timber through on each side of the guide. Work of this kind may be done with timbers each 11½ inches wide by 8 inches thick, down to as small as 3 inches wide by ¾ inch thick. The capacity of the machine, comparatively speaking, is without limits, and the special advantages which it possesses render it desirable in various wood-working establishments. The feed works are very strong and powerful. Swing ing pressure bars are used which have scored a great success in the machinery manufactured by this firm. Their simplicity enables the operator to readily understand their working, and as they are self-adjusting they require little or no attention. As will be seen by reference to the engraving, there are two separate and distinct bars, entirely independent of each other. They are swung so as to come as close to the cutting edge of the knife as possible, and are arranged so as to be moved entirely out of the way of the operator when filing and adjusting the knives or giving any attention to the cylinder that may be necessary. These pressure bars are supplemented by the Goodell patent rolls, which are of such a nature as to admit two pieces of timber of different thickness at one time. In speaking of this machine the makers state that heretofore operators have experienced much difficulty in feeding heavy stuff to the machines, on account of the necessity of raising up the outer end of the timber in order to gain entrance. In the present machine this difficulty is entirely overcome by means of an ingenious device in connection with the feed rolls which raises them to the required hight and allows the timber to enter freely. The operator controls this movement by a lever which works easily, and which accordingly saves him much trouble and annoyance. The jointer heads are easily adjusted, run smoothly and without jar. They are driven from a counter-shaft at the outfeeding end of the machine. The bed may be raised and lowered by hand or power at the option of the operator, and this may be done while the machine is in motion if desired.




*Novelties.—Fig. 1.—Philadelphia Endless Bed Double Surfacer and Jointer.*

### Morrill's Parallel Plyers.

The accompanying engraving represents a form of parallel plyers which is now being put upon the market by Charles Morrill, of No. 64 College place, New York City. The cut is one-third full size, and shows the essential features of the device.

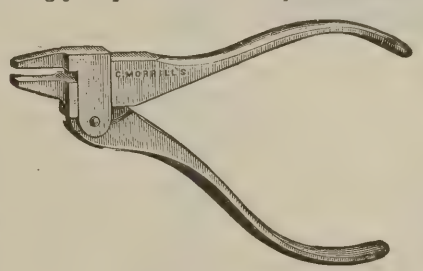


*Fig. 2.—Morrill's Parallel Plyers.*

The jaws of the plyers move parallel, and the cam movement by which they are adjusted has a grip that warrants the name that has been applied to the article, namely, the Giant. When the plyers are fastened to an object that is within their capacity, no matter how smooth the article nor how hard the pull may be, the instrument will not slip, but the object fastened will yield. This is true notwithstanding the fact that the jaws of the plyers are made without teeth or roughness of any sort. The tool is made from steel forgings, and is put together in the best manner. The parts are made interchangable, so that in the event of fracture the tool may be repaired at a minimum of expense, and with the certainty of the new piece fitting the place of the old. Only one size is at present manufactured, although other sizes are contemplated. Mr. Morrill also announces cutting nippers made upon the same principle.

### Combined Buzz or Hand Planer and Rabbeting Machine.

P. Pryibil, of 461 W. Fortieth street, New York, is putting on the market a new machine, which we show in the annexed engraving. It is a combined buzz or hand planer and rabbeting machine, with body cast in one piece, and proof against straining or twisting, however uneven or unsteady the floor on which it is placed. The machine is adapted to beveling, squaring, smoothing, tongueing, grooving, molding and planing out of wind. Both tables are adjustable up and down in such a manner that their edges always remain close to the knives, irrespective of the depth of cut to which they are set. By an independent adjustment both tables can also be moved back or away from the

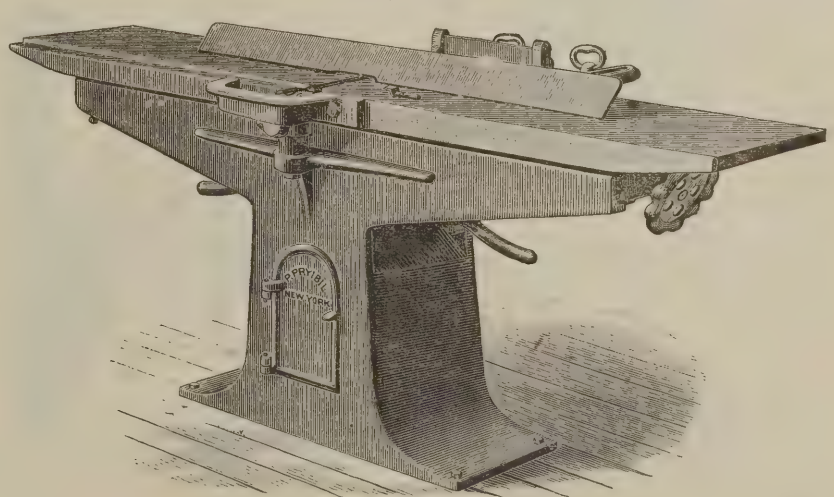
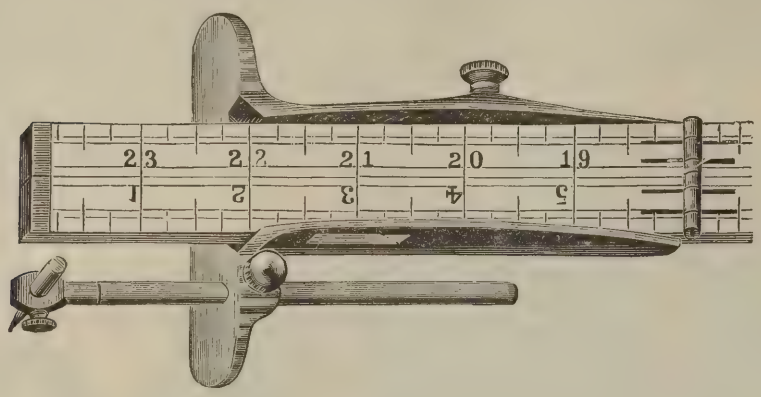



*Fig. 3.—Combined Buzz or Hand Planer and Rabbeting Machine.—P. Pryibil, New York.*

cutter-head to give room for projecting molding cutters, &c., and to give access to the knives. The range of vertical adjustment is such that the tables can be raised



*Novelties.—Fig. 4.—Hall's Adjustable Rule Attachment Used as Scribe.*

½ inch or more above the cutter-head, to allow great latitude in the use of molding cutters. By another adjustment the tables can also be set to plane slightly hollow, so that when stuff is glued up it will be extra tight at the ends and less liable to open. An adjustable square and miter gauge is provided, and a pressure piece with finger protector for rpessing stuff against the

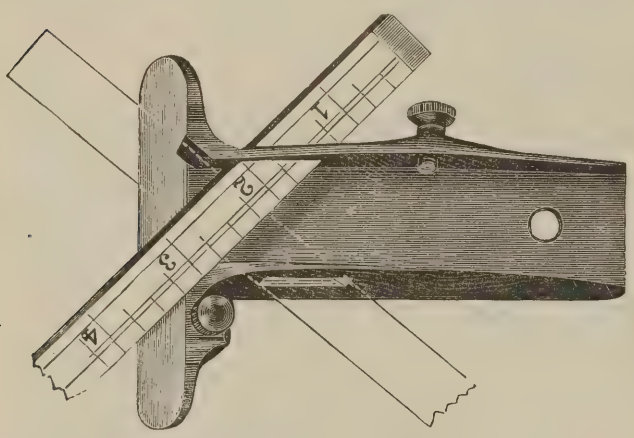


*Fig. 5.—Rule Attachment Used as Miter Gauge.*

gauge. When the machine is to be used for all of the above purposes the cutter-head is provided with T slots and bolts for holding molding cutters, &c., and with a scoring knife at one end to cut the end of the rabbet An overhanging bracket is also provided to support the work while being rabbeted. This scoring knife and bracket, which are essential to good work, are lacking on most of the machines that are claimed to do rabbeting. To set the machine for rabbeting, place the back table level with the top of the cutting cylinder, the front table as much lower as the depth of the rabbet, the gauge as far from the left-hand end of knives as the rabbet is to be wide, and the scoring knife to project $\frac{1}{32}$ inch beyond the cutting cylinder. Proceed as with ordinary planing. This machine is made in two sizes, and with or without T slots and rabbeting attachment. The smaller size has 12¼-inch knives and 7-foot table. The larger size has 18¼-inch knives and 7-foot table.

### Adjustable Rule Attachment.

Messrs. Herring & Sweasy, Nos. 70 and 72 Reade St., New York, have become the sole agents for Hall's Adjustable Rule Attachment, two applications of which are shown in Figs. 4 and of 5 the engravings. This is claimed to be a tool for every carpenter, cabinet-maker, coach and car builder, as well as for sundry other mechanics who have occasion to draw lines and construct angles. In use it is applied to a common 2-foot, fourfold boxwood rule. Used as marking guage, the point or pencil, as the case may be, is readily set by the end of the rule, as shown in the first of the two engravings. With the rule in position as shown, the rod carrying the pencil or point can be turned so as to bring the end of the pencil against the rule, thus determining to a nicety the distance of the line to be drawn parallel with the head of the tool. After the pencil has been so adjusted, the rod is revolved in its socket and is fastened in place by the thumb-screw shown in the engraving. The second view shows how the attachment may be used as an angle gauge for right and left hand miters. The flanges on the side of the tool are mortised in such a way as to permit one fold of the rule to pass through them, and when in this position the lines scribed will form a perfect miter with the face of the tool. The reverse miter can be obtained by putting the rule through the tool in the opposite direction. Still other applications are possible which will be readily perceived by the intelligent reader. The makers enumerate the following functions performed by this device: With the tool applied to a common rule the mechanic secures a try square from ¼ inch to 12 inches; a miter gauge, right and left hand, with either long or short tongue; a mortise gauge, accurate, and quickly applicable for laying out work; a scribe or marking gauge; a depth gauge, convenient and valuable for squaring mortises and tenons; a pencil marking gauge used to advantage for putting on locks and butts, and unequaled for doing short work about doors and windows. The tool is also provided with a threaded hole near the back of the space into which the rule slips and which receives a point that is furnished with the tool and which serves as a center for striking circles. With this center put in place, and a pencil placed in the sliding holder shown in the cut, circles can be described varying from 7 to 14 inches in diameter. This affords a tool in character equivalent to trammels, in addition to the other uses already enumerated.

### A New Door-Knob.

The Boston Knob Company, 169 High street, Boston, Mass., for whom Sherman & Fearing are general agents, 100 Chambers street, New York, are putting on the market a new door-knob which possesses features of special interest and is illustrated in the accompanying cuts, Figs. 6 and 7. The construction of this knob, which is made of hollow metal and covered with celluloid or zylonite, thus permitting the knob to be given any desired color, is shown in Fig. 7. From this it will be seen that the ball of the knob and the shank that runs through it are of one piece of malleable iron. When the zylonite has been applied to the two halves of the knob the knob is put together with the bronze band in place, as shown in Fig. 6, when the bronze sleeve is heated and pressed home under heavy pressure, thus

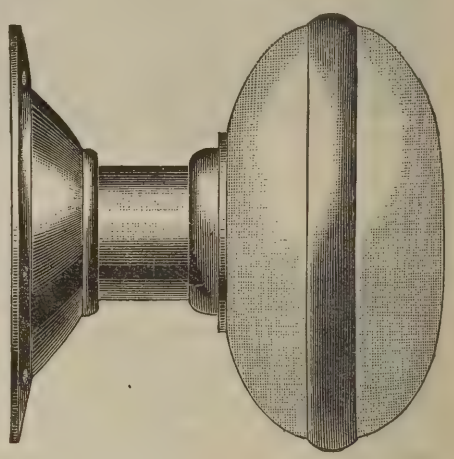


*Fig. 6.—The Boston Knob Co.'s Door-Knob.*

making the knob and shank, it is claimed, as solid as if of one piece. Attention is called to the strength of the knob as thus made, and the fact that there is no danger of its pulling off or working loose, since no lead is used in its construction and it is not affected by heat, cold or moisture. The beauty and durability of the celluloid or zylonite with which the knobs are covered, and which is referred to as possessing fully one-third more wearing quality than ivory, are features of special importance. The trimmings of the knob

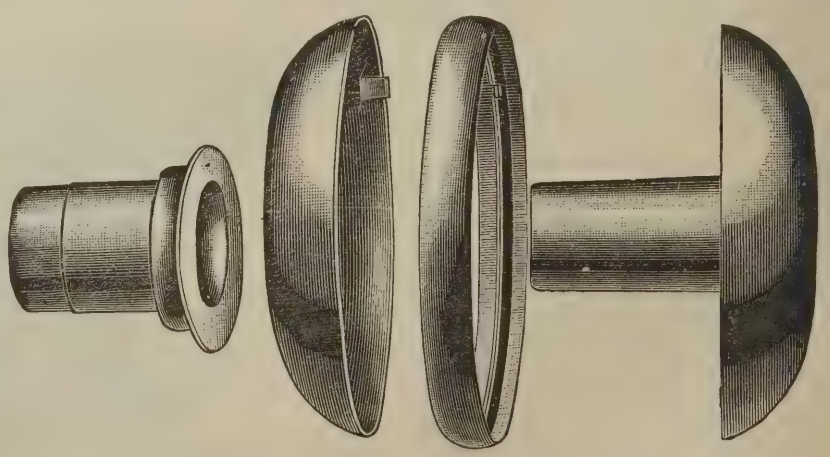


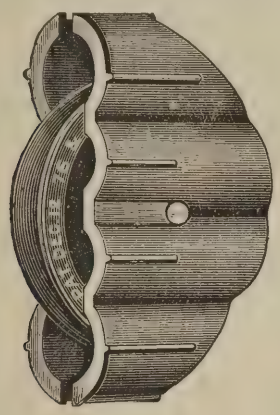
*Fig. 7.—Sectional View, Showing Construction of Knob.*

and the band running around it, as shown in both Figs. 6 and 7, are made of solid bronze, thus rendering their part to the durability of the knobs. The catalogue of the company, which is devoted to these knobs, gives a list of 18 colors in which the knobs may be regularly procured, with the

intimation that any unspecified colors may be procured if desired, thus giving a wide range of choice and permitting the selection of a color to match the decoration of the room. It also represents the knobs in different colors, thus giving a better idea of the effect of the bronze and the colored zylonite. These goods are put on the market as combining in an exceptional degree the qualities of strength, beauty and durability, and, as something quite new, they will doubtless receive the attention of the trade.

### The Empire Sash Pulley.

The illustrations, Figs. 8 and 9, represent an article manufactured by the Empire Portable Forge Company, Cohoes, N. Y. Its general features will be understood with-



*Novelties.—Fig. 8.—The Empire Sash Pulley.*

out detailed explanation. It will be seen that it has no face-plate and does not require any screws. The mortising is done with a ⅞-inch auger bit, and requires, it will be perceived, only four holes. The centers of the holes are marked without the use of gauge or center marker, by laying the points of the ribs on the line which is to be the width of the mortise and tapping with a light hammer.

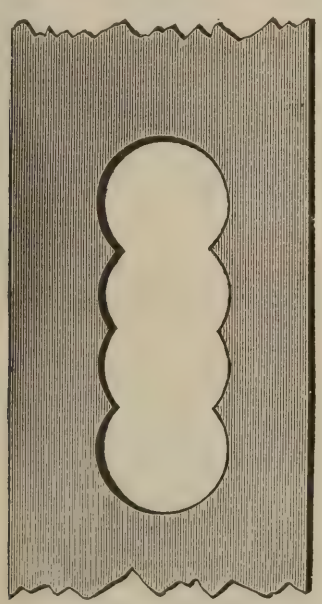


*Fig. 9 —Mortise for Sash Pulley.*

When boring from the exact centers four straight parallel holes the pulley may be inserted and driven home, a small block being used to protect the edges. It is claimed that the pulley will then be securely held and cannot get away, as the shrinkage of the wood will clasp it tightly, but if it is desired to make it more secure small brads or nails may be driven diagonally in the casing through the slots at each end. These pulleys are made with ¼ inch steel axles, with plain face, unground wheel; plain face, polished wheel; bronzed and polished face and wheel and nickel-plated and polished face and wheel, and are described as of the best material and strong and durable.

### The Combination Hand Vise.

The accompanying illustrations, Figs. 10, 11 and 12, represent a hand vise manufactured by Hayden & Barnes, Syracuse,

*Fig. 10.—The Combination Hand Vise.*

N. Y. As will be inferred from the illustrations, the vise represented in Fig. 10 is provided with a plate, Fig. 11, in which it firmly and securely fits, so as to be used as a

*Fig. 11.—Plate to Attach Hand Vise to Bench.*

bench vise, as indicated in Fig. 12. It is described as made of cast steel throughout. The jaws are checked and tempered, are 1 inch wide and open 1 inch. The jaws are polished, and the body of the vise and the bench plate japanned. The manufacturers

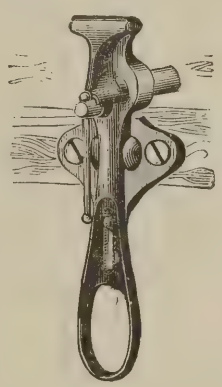


*Fig. 12.—Vise Attached to Bench.*

call attention to the form and finish of these as well as of the other vises which they are manufacturing, and to their simplicity of construction as permitting them to be put on the market at an exceptionally low price.

### Pointed Nail Set.

The Edward Storm Spring Company, Limited, Poughkeepsie, N. Y., are directing attention to Cannon's Diamond Pointed Nail Set, which they are manufacturing, and an illustration of which appears in Fig. 13. The object of the point with which the end of the set is provided is to prevent the set from slipping from the head of the nail while in use, thus saving in many cases serious damage to the wood. It is asserted that with this tool a mechanic can follow a

*Fig. 13.—Diamond Pointed Nail Set.*

nail through any piece of stuff without the set slipping off. The sets, we are informed, are carefully made from the best quality of tool steel. The parts are turned and thoroughly tempered. The sets are warranted by the makers. Several sizes are manufactured.

### New Earthen Tile.

The accompanying engravings represent a new earthen roofing tile recently put upon the market by J. W. Penfield & Son, of Willoughby, Ohio. The larger engraving shows the manner of combining three tile,

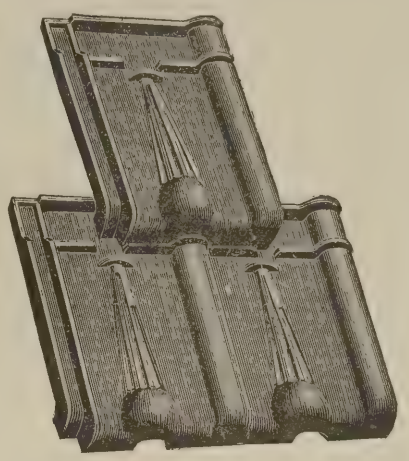


*Fig. 14.—Manner of Combining the Penfield Roofing Tile.*

while the smaller engravings show the top and bottom of a single piece. It will be seen that the joints are broken in the process of laying, and that the configuration of the tile is such as to impart an ornamental appearance to the roof. Among the advan-

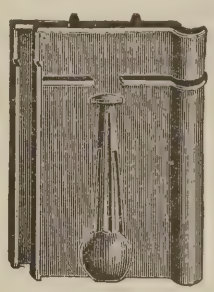


*Fig. 15.—Face View of a Single Tile.*

tages to which the makers direct attention are that these tile are so strong that they will not crush when it is necessary to walk over the roof. The tile also are very light as compared with other roof coverings of the same character. The excess of weight as compared with ordinary roofing slate is

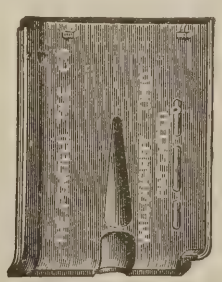


*Fig. 16.—Under Side of a Single Tile.*

said to be only about 10 per cent. The special feature of this tile is the color imparted to it in the process of making. It may be described as a blued tile made by a patent blueing process controlled by this firm. The same clay makes both the red and blue tile without use of chemicals, the variation of color being in the process of firing. The tile is thoroughly colored through the entire body, so that a fracture shows the same color as the surface. The tile are designed for use on first-class buildings.

## The Mahony System of Steam Heating.

The following remarks on steam heating and the cuts showing the plan and elevation of a house heated by steam are from a catalogue recently issued by M. Mahony, Troy, N. Y., and 85 Centre street, New York City :

There are three systems of heating by steam, commonly known as : 1. Direct radiation. 2. Direct-indirect radiation. 3. Indirect radiation. The first requisite in any of these systems is a good steam producer which shall have ample capacity to do the work required. It is recommended whenever practicable to have two boilers of the combined capacity required in place of one. The duration of the cold season, when the full capacity of the heating apparatus is required, is very short, whereas for many months only a moderate heat is necessary and half of the full boiler capacity is sufficient. This is an economical arrangement, and with boilers that require no flue cleaning, such as the Mahony boiler, it saves much unnecessary labor. The second essential is the arrangement of the main steam return and drip pipes in cellar. In referring to these points it is intended to allude only to the arrangement of pipe systems with the low-pressure gravity return, which requires the bottom of the radiators or indirect coils to be placed at least 2 feet above the water line of the boiler. The main steam-pipe where it is connected to boiler should be its highest point, and thence it should incline to the furthest end of the system, having a fall of not less than ¼ inch in every 10 feet of length. All openings to radiators, indirect coils and rising steam lines should be upward and vertical. At the end of main steam-pipe there should be a downward opening of same size as pipe, and in it a piece of same pipe about 6 inches long, forming a "bottle," with a reducing coupling to fit size of drip-pipe, which should be connected to the end of main return. The ends of the horizontal pipes connecting main steam to rising lines of steam-pipes should have bottles, as described, with drip-pipes. These drip-pipes and the vertical return lines should be connected vertically or obliquely to the main return. The main return, which is below the water line, should incline from its furthest end, with a fall of ⅛ inch to every 15 feet. At boiler end it should be about 2 inches above ash-pit base and rise here vertically to boiler.

By this arrangement it will be observed that steam and return pipes form an extension of the boiler, the former pipes giving steam and the latter water space. It is thus perfect circulation is secured, whether radiators, coils or rising lines are in use or otherwise. When used main valves are placed on the steam and return pipes near the boiler, and on the main return-pipe a check-valve is also fitted. Valves are also placed on the drip-pipes. On the steam and return vertical pipes, when supplying more than one radiator, stop-valves are put on. On the steam pipe the position of the valve is on the vertical rising line above the horizontal pipe, and on the return it should be low down near main horizontal return-pipe. All these valves on small systems of heating, such as are used in dwellings, may be dispensed with. When applied they should always be left open, except in case of leakage, as the supply of steam to radiators is controlled by radiator-valves. The lowest point on return main should have an emptying cock and the boiler a blow-off valve.

DIRECT RADIATION.

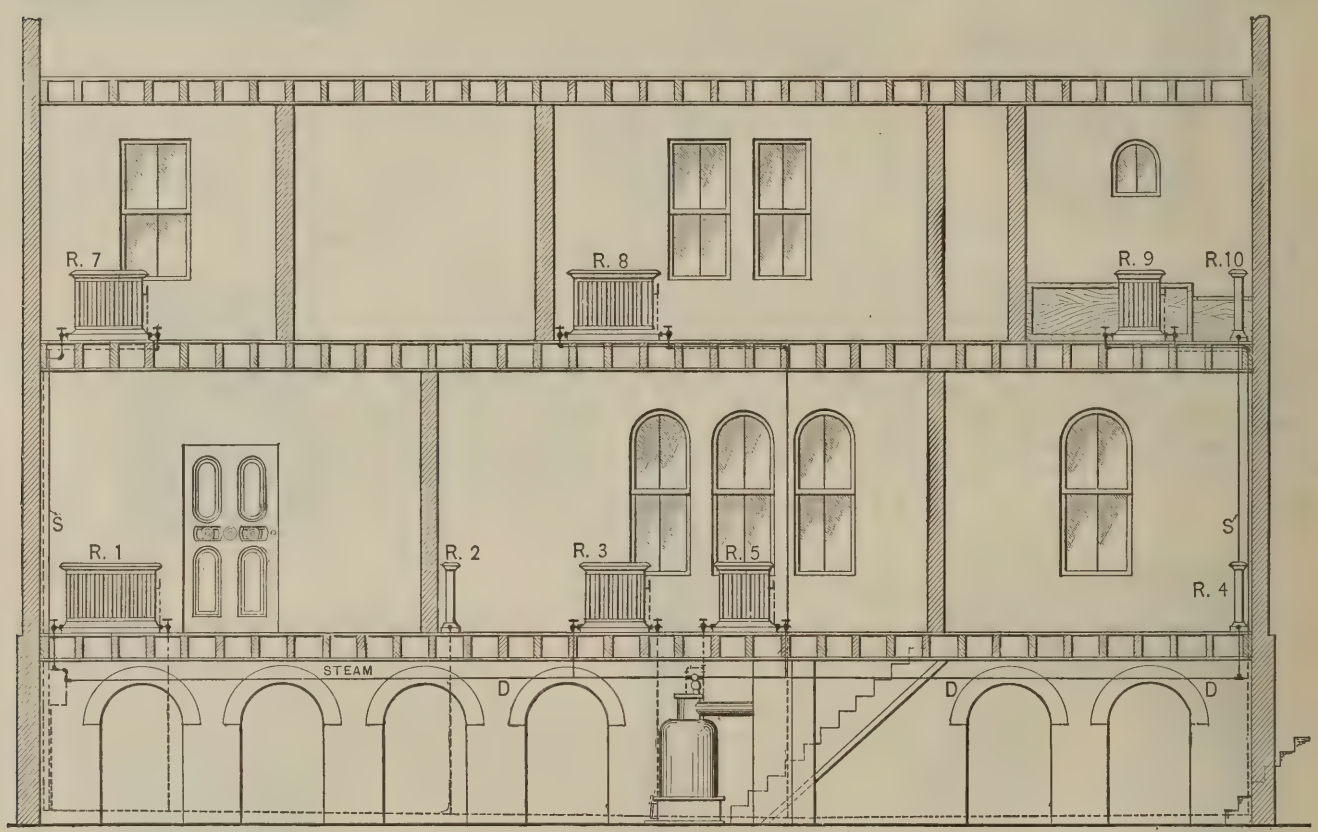
In this system the air in the apartment is heated by contact with the radiator placed in the room. Each radiator is fitted with a steam and return valve which can be closed and opened as the temperature needs. These valves should never be half opened, and both should be operated together if possible. When operated separately the return-valve should be the first one closed, and the steam-valve the first opened, An automatic air-valve or air-cock is placed on return end of radiator, and may be fitted with drip-pipes to cellar. By the use of air-cocks radiators may be left partially filled with air to reduce their radiating surface. This is not practicable with air-valves. The position of the radiator is controlled by the form of the apartment, but if possible it should be placed near window or coldest wall, and where there are many windows two radiators are desirable. Placing screens, closed or open, or marble tops on radiators interferes disadvantageously with their heating-power.

DIRECT-INDIRECT RADIATION.

The arrangement of pipes in cellar, drip-pipes, rising lines, connections, &c., is the same as just described. This system consists of the direct fresh-air supply to the radiator which is placed in the apartment to be heated. The radiator may be inclosed in a screen, handsomely finished, with a perforated top or one fitted with registers. A small tin duct, about 3 inches high by the length of opening in base of radiator to which it is connected, is taken through the wall or below the window sill, through which the fresh air passes and is heated by convection in its passage to top of radiator. This system can be applied in some rooms as desired, while direct radiation is used in other rooms.

INDIRECT RADIATION.

When this system is used the steam apparatus is entirely located in the cellar. The disposition of the main steam and return pipes is similar to that already described. Each apartment to be heated has in the cellar a separate radiator or coil suspended from the cellar ceiling, inclosed in a 1 inch tongued and grooved wooden, or a galvanized No. 24 iron, casing; if the former is used it is lined with tin. The most durable




*The Mahony System of Steam Heating.—Fig. 1.—Longitudinal Elevation.*

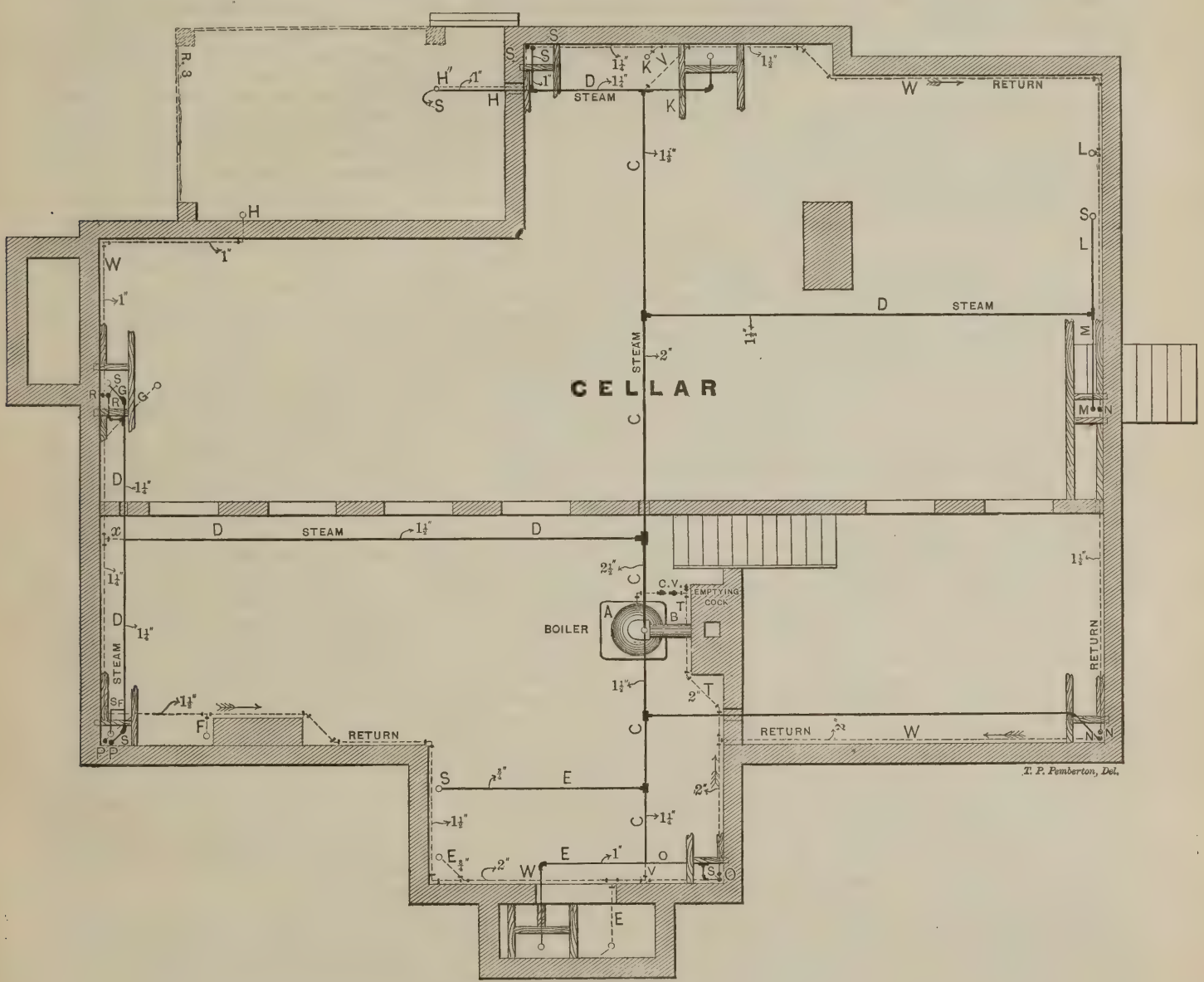
casings, and those least wasteful of heat, are composed of soldered tin, asbestos cloth, wooden boards, tongued and grooved, and then inclosed in coverings of galvanized No. 24 iron. The space above and below the coils or radiators should not be less than 8 inches. To the upper space at one end is fitted a tin duct, connecting casing with register-box, which receives register on floor immediately above cellar; or with air-pipe, which is generally built in wall, to which is fitted the register in the appartment to be heated. The space below coil or radiator is connected to a main cold-air duct, through which the fresh air from outside is admitted to the radiator, where it is heated previous to its ascent through warm-air ducts or pipes to registers which regulate its discharge into apartment. The main fresh-air duct should be fitted at its outer end with wire screen of ½-inch square mesh, and damper-door to control the admission of air. These dampers are sometimes worked automatically, and with advantage, to prevent the air coming into the house when steam goes down. It is desirable, however, in addition to the main damper, to fit damper in the air-duct leading to each separate casing. Each radiator should be fitted with an automatic air-valve,

connected on the return-pipe and placed a little higher than the top of radiator or coil. It is not necessary that each radiator should be fitted with steam and return valves, but if they are used it is well to keep both valves always open and only use them is case of repairs.

NOISES—KNOCKING OR HAMMERING.

These disagreeable noises, which are unfortunately so common in many heating apparatus, can be avoided by attention to the disposition of the pipes. These should be arranged so that all water of condensation will naturally fall or flow to the water line of the system. All drip and return pipes should be of ample proportions. Long horrizontal connecting drip and return pipes should be avoided; when used as much incline as possible should be given, and circulating pass pipes should be supplied where necessary to prevent the collection of water of condensation. Automatic air-valves should be placed where it is probable air may be held. Knocking and hammering are the result of the accumulation in separate alternate bodies of water and air which are forced through the one orifice; water, being the heavier, tries to descend, while the air, the lighter body seeks to ascend and is repulsed by the steam pressure. The mystery, so called, may be more or less exemplified by a bottle partially filled with water. Withdraw the cork and turn it upside down, and the strugle of water and air in their descent and ascent is seen.

We present in Figs. 1 and 2 a longitudinal elevation and cellar plan of a house heated by steam, the cuts illustrating the practice adopted by Mr. Mahony. The total capacity of the apartment heated is 27,000 cubic feet, and the total heating surface of the radiators and coil is 421 square feet. Twelve radiators in all are used, the location of nine of them being shown in the sectional view. In Fig. 1 the reference letters S refer to the steam and return connections to radiation in upper end rooms. In Fig. 2, showing the cellar plan, A is the steam boiler; B, smoke-pipe with check-draft and damper; C, main steam-pipe; D, branch pipes; E F G H K L M N O P R and S, steam and return connections to the several radiators; T, main return-pipe with check, stop and blow-off valves; U, circulating drip-pipes from steam-pipes, and W, return-pipes. The disposition of the radiators, the arrangement of pipes, their size, &c., can be seen by reference to the cuts.




*The Mahony System of Steam Heating.—Fig. 2.—Cellar Plan.*

## Concrete Floors.

A writer in one of our English exchanges gives some particulars with reference to the management of concrete floors. He says:

These are sometimes formed on a centering of pieces of fir of proper scantlings resting on a trestle or on the lower flanges of the girders. Across these transverse pieces are laid and boarded with boards of, say, 1 inch thick and close jointed. The concrete is laid in bays; each is finished in one operation, so as to form a slab. The ingredients may be as follows: 1 part cement to 4 parts of breeze or other porous substance, iron slag, hard bricks, well-burnt clay, which have to pass through a ¾-inch mesh. If fine stuff is required clean smiths' ashes may be used as being better than sand, the fine stuff not exceeding one-third of the whole. Portland cement, fine ground, capable of passing through a sieve of 2500 meshes per square inch, should be used, and the following test is given: When made up wet and filled into a glass bottle and struck level with the top, it must not in setting crack the bottle or rise out of it, or become loose by shrinking. When filled into molds, and after being seven days under water, it must have an ultimate strength under tensile stress, slowly applied, of 250 pounds per square inch of section. The mixing is to be performed by turning the ingredients over twice dry, then shoveled to a third heap, at the same time adding from the rose of a hose water enough to make the ingredients cling together. The broken material and breeze should be damped before mixing. The concrete, after being laid, is slightly rammed with wooden beaters, and the surface should be kept damp by water 14 days after laying. The soffits should be well wetted, and a setting coat of fine stuff given. These are the instructions given in a specification for concrete floors, and may be usefully followed. Slabs of concrete 6 inches thick have been found to break from 1 cwt. to 2½ cwt. per foot superficial, the size of slab being about 14 feet x 13 feet in the former case and 14 feet x 7 feet in the last. Experiments have not been sufficiently numerous or conducted with enough exactness to insure any reliable rule; the slabs crack suddenly, and there is little warning after the ultimate resistance has been reached.

# TRADE NOTES

MESSRS. GUMMEY, SPERING, INGRAM & Co., of Philadelphia, writing about their Alderly terne plate, use the following language: "We will guarantee Alderly terne to be well coated and the body of the plate to be first-class iron. For toughness it cannot be excelled. It has been tested and used by many of the leading roofers of this country, by whom it is unqualifiedly indorsed." Concerning Penn Old Method roofing plates they say: "These have an extra coating, which can be tested by using a knife or other sharp instrument. The plates are rolled uniformly to gauge, and the body of the plate is not rolled one gauge heavier, so as to make it appear that they are more heavily coated than others."

ALBERT KOMP, with office and factory at No. 55 Lewis street, New York, has sent us an illustrated price list of natural wood ornaments, turned and embossed corner blocks, &c. The designs shown represent both staple and special goods, and are priced in various sizes. Rosettes, panels and borders in white wood, cherry, walnut and ash are included.

AT THE Thirteenth Industrial Exposition at Cincinnati, now in progress, the Cincinnati Corrugating Company have for the exhibition of ware made by them a model cottage, the interior embellishment of which represents the application of corrugating in a very desirable and attractive manner, their treatment of the ceiling finish being the most notable feature.

WE HAVE RECEIVED from the Manly & Cooper Mfg. Company, Elm avenue and Forty-second street, Philadelphia, a copy of their catalogue presenting wrought-iron work, both structural and ornamental. Among the goods shown are iron railings, rolled moldings, spiral stairs, dropped-forged fences, pickets, crestings, tree guards, carriage gates, grills, &c. In a number of instances the position in which some of the designs have been used is indicated. For example, in designs for railings we find one credited to the Cleveland Viaduct and another to a structure on Coney Island.

WE HAVE RECEIVED the prospectus of the Academy of Architecture, located at 3066 South Ninth street, St. Louis, of which H. Maack is the principal. The Institute is designed to be for the building trades what the commercial colleges are for business men. Instruction is to be given only during the winter, leaving young mechanics their time to devote to remunerative employment during the busier months of the year. By this means it is argued young men who could not otherwise afford the cost of instruction will be enabled to avail themselves of the opportunities afforded. The circular contains the course of study through three terms, and also indicates the requirements for admission as well as cost. This enterprise seems to be a commendable effort to afford technical education in a form to be of the greatest service to young mechanics in the building trades.

AT THE CINCINNATI INDUSTRIAL EXPOSITION the following firms show clay-working machinery: J. W. Penfield & Son, Willoughby, Ohio; Chambers, Brother & Co., Philadelphia; Fletcher & Thomas, Indianapolis; C. & A. Potts & Co., Indianapolis; Jonathan Creager's Sons, Cincinnati: C. W. Raymond, Dayton, Ohio; George E. Noyes, Georgetown, D. C.; Anderson Foundry and Machine Works, Anderson, Ind.; D J. C. Arnold, New London, Ohio.

AMONG THE PATENTS issued August 24 is one to J. S. Thorn, of Philadelphia, entitled "combination metallic roofing tile plate." Two designs of tile are shown in the drawings, both representing more than one tile in a single plate. In one instance there are four tile in a plate and in the other two. The special advantages derived from this construction are that by this means a very small figure is obtained upon a roof with a comparatively small number of plates to be handled in laying and a correspondingly small number of joints to be made secure. The designs shown are similar to those of the single tile which Mr. Thorn has been introducing to the trade for several months past, and have the advantage of being somewhat architectural in their general appearance.

THE NEW YORK LUMBER AND WOOD-WORKING COMPANY, with factory and yards corner of 134th street and Alexander avenue, and New York office at 22 Cortlandt street, have sent us their catalogue, a handsome pamphlet of upward of 100 pages. This work differs from many others in common use from the fact that it is a special catalogue and not a stock-book containing design, which a large number of manufacturers are using in common. It is well printed on excellent paper, and contains the latest shapes in moldings, balusters, newels, &c. A number of designs of mantels are represented, and likewise of vestibule, front and interior doors, wainscoting, stairs, &c. Three pages are devoted to Queen Anne doors, many of the designs being of special excellence. Dumb waiters, kitchen dressers, closets, wardrobes, bathroom fittings, wash-trays, pew ends, sash, brackets and scrollwork are appropriately illustrated.

A NEW CATALOGUE issued by Frank H. Clement, Rochestor, N. Y., contains illustrations of a number of new machines which this manufacturer has put upon the market within a short time past, some of which have been illustrated and described in our columns. The pamphlet, we are informed by Mr. Clement, has been prepared for distribution among foremen and proprietors of wood-working establishments. It is very tasteful in its arrangement, and contains much information that is of interest and value to the class addressed. Among the new machines may be mentioned a patent buzz planer, automatic lathes, band, scroll and resawing machines, tenon machine, &c.

A PROMINENT FEATURE of the Thirteenth Industrial Exposition, now in progress in Cincinnati, is the display of wood-working machinery in Power Hall. The Egan Company, of Cincinnati, are said to have the largest and finest display. They have 12 entirely new machines on exhibition, several of which are decided novelties.

A FEW WEEKS SINCE the New York Lumber and Wood-Working Company had the misfortune to lose its dryhouse and storage building by fire. The factory, with its valuable equipment, was saved, and did not even stop its machinery on account of the fire. Early in the spring, when strikes threatened various enterprises in this city, the officers of the company thought it of the utmost importance that an out-of-town mill should be provided in connection with the manufacturing facilities controlled in the city, so that contracts could be filled without delay in case of strikes or accidents. The company bought a large sewing machine factory at Batavia, N. Y., together with 25 acres of land for dwellings for its mechanics. This factory has been fitted up with the latest and most improved machinery, and we are assured that like quantity and quality of machinery are not to be found together in any one place in this country or in Europe. This forethought enables the company to handle and dry all their own material in Batavia advantageously, in a market where labor is cheap, and where labor difficulties are seldom encountered, and by reason of it the business was able to go on without interruption, notwithstanding the fire in the dryhouse and storage building above mentioned. The company also own large dock property in Tonawanda, N. Y. They supply the trade with lumber from their own pine lands in Michigan and Canada. Their business is so conducted that it may be asserted that practically the company cut the tree in Michigan, and put it into a house in New York. These advantages, which are unusual, will undoubtedly bring the company into a very prominent position.

IN THEIR CARD in another part of this issue the Syracuse Twist Drill Company enumerate eight special reasons why the twist drill bit is the best for use by carpenters and builders. Among the reasons presented we note accuracy in size, convenience in sharpening, and the ability to work in any direction of the wood without splitting. It is also said to cut off nails and to enlarge a hole without plugging.

THE CINCINNATI MOLDING COMPANY, of Cincinnati, announce that they are ready to supply over 100 designs of carved moldings, in character equal, and in some cases superior, to handwork. The moldings are suitable for inside finish, for counters, desks, bank fixtures, furniture, &c. In their card which appears in another part of this issue they make a liberal offer on a sample board of leading styles.

J. F. WOLLENSAK, of Chicago, offers the trade an illustrated price list of theatrical hardware and other specialties which he is manufacturing. The list covers many articles that are not found in regular trade and which are frequently needed by builders.

MESSRS. HAM & ELLERY, of Albany, N. Y., are directing attention to an improved plumb bob and level which they are manufacturing in three sizes.

THE NEW THING to which Chas. A. Strelinger & Co., of Detroit, Mich., direct attention in their card in this issue is something that will strike most builders very favorably. There is no particular skill required to operate a pair of tinner's snips, but the lack of such a tool frequently makes expense in the necessity of sending for a tinner. Messrs. Strelinger & Co. offer by mail a good tool at low prices, thus enabling carpenters to add it to their regular kit. With such an article tin, sheet iron and other metals, wire cloth, &c., can as readily be cut by a carpenter as by a tinner.

THE GUARANTEES applied to Old Style roofing tin by N. & G. Taylor Co., Philadelphia, are specifically enumerated in their card, which appears in another part of this issue. Among these we note toughness and ductility in the body of the plate, thorough coating and uniform quality.

WM. E. UPTEGROVE & BRO. present in their page this month a general view of their office and yard, at the foot of East Tenth and Eleventh streets, this city. They again advise builders, architects and house owners to adopt mahogany for interior finish, and request correspondence before other hardwoods are decided upon.

AMONG LARGE ORDERS recently booked by the National Sheet Metal Roofing Company, of New York, is one coming through Wheelwright & Hunt, of Tacoma, Wyo. Ter., covering 210 squares of 14 x 20 shingles, and 25 squares of 7 x 10 shingles. The business of this company for the present year has shown double for each month of that done for the correspondings months last year.

THE CONTRACT for the galvanized-iron work on the new courthouse at Council Bluffs, Iowa, has been secured by Bakewell & Mullins, Salem, Ohio. This firm will also supply the work in the same line for the new courthouse and jail at Houghton, Mich.

AMONG THE EXHIBITS at the Minneapolis Exhibition is one by the Cambridge Roofing Company, of Cambridge, Ohio, showing their specialties in metallic roof coverings.

A CIRCULAR has been issued by Hycent Pursell, manufacturer of elastic cement for repairing roofs, &c., with office at No. 239 Main street, Cambridgeport, Mass. The circular contains a brief description of the usefulness of the article, and mention of some of the more prominent buildings upon which it has been employed.

WE LEARN FROM CHICAGO that the Lloyd Iron Roofing and Paint Company have been making rapid progress in introducing their iron roofing and siding in our western territory. We are informed that the company are now running their works to their full capacity, and have booked many large orders.

THE ST. LOUIS CORRUGATED ROOFING COMPANY, St. Louis, Mo., issue a unique and striking calendar calling attention to their roofing, siding and ceiling.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

VOLUME VIII. NEW YORK, NOVEMBER, 1886. NUMBER 11

## NOTES AND COMMENTS.

THE IMPRESSION seems to prevail, throughout the West at least, that the coming winter and spring will witness considerable activity in the building trades. A great deal of inside work will be done this winter. The impulse which has been imparted to building and manufacturing is the result of causes and agencies which have been at work for a year or two past. Prices of all kinds of materials are firm, and yet the supplies are abundant. Prices have declined to the lowest possible safe limits, and investors and builders recognize that no further depression is to be anticipated.

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THE PROSPECTUS of the New York Trade Schools for the sixth season, which commences October 25, has been issued. This institution affords evening instruction in plumbing, gas-fitting, bricklaying, plastering, stone-cutting, fresco painting, wood carving and carpentry. Day classes are also conducted in plumbing, bricklaying and wood carving. The charges, which include the use of tools and materials, are very reasonable. For example, the full course in carpentry is placed at $15. This class is reserved for young men between 16 and 21 years of age. Instruction is given on Monday, Wednesday and Friday evenings from 7 o'clock to 9.30, and the term extends from the above date to the 6th of April. The use of the different tools commonly employed in this trade is first covered in the course, after which construction is undertaken involving planed material, with mortise and tenon joints. Panels are then framed and moldings put on, and still later doors and shutters are made. The course of instruction is managed so that each member of the class secures a varied amount of work. A very handsome exhibit of work done by members of this class in the past is on exhibition at the school. The terms for instruction in wood carving are $10 for the course. The same price is also attached to the course in fresco painting, and instruction in each of these departments is as thorough as in that above described.

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THE CIRCULAR before us is of great interest to all who are contemplating the acquirement of a trade, as well as to parents considering the question of practical education for their sons. Illustrations in the circular include a view in the plumbing-room, a view in the plastering-room and some views in the bricklaying and fresco-painting departments. The instruction in the bricklaying department includes the building of 8, 12 and 16 inch walls, piers, arches, flues, fireplaces, and setting sills, lintels, &c. The growth of the school will be understood by the following figures, which represent the attendance in years gone by: The first season 30 pupils were enrolled; the second, 88; the third year the attendance rose to 207; the fourth season figures were slightly less, being 198, while in the fifth year they ran up to the handsome number of 304. These schools were not intended to be either a charitable or a money-making institution. They are not managed in the interest of, nor are they in opposition to, any trade organization. They are established solely for the benefit of such young men as may desire to avail themselves of the opportunities they ofier. The schools are located on First avenue, between Sixty-seventh and Sixty eighth streets.

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A VERY IMPORTANT step has been taken by the master builders of Boston. An association has been formed and a code of working principles for the year 1887 has been adopted. The code is in the form of five propositions, the interpretation of which virtually covers every phase of the business which is being transacted. The first of these relates to a change in methods of payment for labor. Beginning at a date not later than the 1st of April next year, all work is to be paid by the hour, excepting only such work as is known as piecework and in the case of foremen and superintendents and others engaged by the year. In order to test the question of the hours of labor it is proposed on the 1st of April to make the day nine hours. All work done before the regular hour of commencement in the morning and after the regular hour of quitting in the evening is to be paid for as overtime at rates to be agreed upon. This plan is to continue during the year 1887 as an experiment. The third proposition in the code refers to the insertion of a clause in every building contract releasing the contractor from any forfeiture or demurrage on account of delays growing out of strikes. The fourth proposition relates to improper interference with business, and is aimed particularly at the trouble caused by the walking delegates of the trade unions. The fifth relates to arbitration, and provides a means by which all grievances between employer and employee may be adjusted without resort to strikes. An agreement has been drawn up to which names are being attached. An invitation has been extended to all contractors, whether located in Boston or in other parts of New England, to join in this attempt to make fair trial of a scheme which the promoters think is calculated to set at rest labor agitations in the building trades.

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THE SYSTEM of payments by the hour, while by no means novel, has never been very generally adopted in any of the trades connected with the building industry. It has many features to recommend it, chief among which is that it will tend to prevent all unreasonable shortening of the labor day. The workman paid by the hour will not be so enthusiastic in favor of the eight-hour system as under the old arrangement, when his wages were paid by the day, irrespective of the actual time spent in work. As the master builders, however, define the working day to be nine hours, we do not see that the new system will prove of any immediate benefit to them Perhaps the object in view was to familiarize the workmen with the payment per hour system and effect its permanent adoption, so that if in the future it should become necessary to shorten the working day the employers will not be placed in such a disadvantageous position. The wisdom of it will be demonstrated by a year's trial, at the end of which time it can be continued or changed as the results of experience may dictate. The agreement to have all contracts drawn so that the contractor is relieved from responsibility for delays caused by strikes is a very important clause, and we heartily wish that it may be lived up to in good faith. The workmen, well aware of the helpless position of their employers when bound by a time contract, have not hesitated to wield their power without mercy, and instances without number might be cited in the building trade in which contractors have been forced to yield to unjust demands simply because resistance meant bankruptcy. More than one case is on record where builders have followed the honorable but disastrous course of refusing to comply with unreasonable demands, and have preserved their self-respect at the expense of an exhausted bank account. Place the contractor in a position where he can maintain his rights without suffering financial loss, and the frequency of unreasonable strikes will rapidly lessen.

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THE CODE adopted by the Boston master builders is heartily indorsed by the *American Architect*. In commenting on the article referring to the insertion in building contracts of a clause relieving the contractor from responsibility for delays caused by strikes our contemporary says: "That the master-builders, if they will really try to encourage and defend liberty of individual action among their men, will have the sympathy and encouragement of the community is evident, as well from what has already occurred as from the voluntary expressions of the persons invited to the Boston meeting, who assured them, as we are told, that the insertion of a clause in all building contracts relieving the contractor of all claims for forfeiture or demurrage on account of delays through strikes 'would be cheerfully granted.' We believe that this is true, and that most people would willingly submit to the inconvenienee of binding themselves, according to the form now common in England, not to demand damages for delay 'in case of combination of workmen or strikes or lockout affecting any of the building trades,' for the sake of helping in a struggle against tyranny; but if the public is to put in the hands of the builders this powerful weapon, which enables them to defy all attempts of the unions to dictate terms to them, it will expect them in return to act promptly in endeavoring to avert or settle as speedily as possible all labor quarrels."

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IN FOREIGN COUNTRIES, Germany and France especially, the use of regenerative gas burners and what are known as "gas glow lamps" appear to be constantly increasing. From time to time descriptions of these burners have been published, so that

we presume our readers are measurably familiar with the general principles according to which they are constructed. It may be well, however, to point out their general features and refer to their differences. A regenerative gas burner supplies the flame with heated air. The preparatory heating is sometimes done by a separate gas flame which heats a surface with which the air supply is brought in contact before reaching the place of combustion. The ordinary method, however, is to have the gas flame inclosed and the air led from above and heated during its passage by contact with hot surfaces of one kind or another. The gas glow lamp is made with or without the regenerative attachment, though when without it is usually adapted for water gas only. The light from a glow lamp is obtained through heating some incombustible substance to incandescence, the result being a steady, even light closely resembling the incandescent electric light. The gas glow lamps vary very much in their construction, and each year is adding to their number. They differ in the method of burning the gas and in the shape and substance of the incumbustible to be heated.

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THE CLAIMS made for both the regenerative and gas glow lamps are saving of gas or increased illuminating power, and a more pleasant light for reading or working by. There can be little doubt that the regenerative gas burner is economical so far as consumption of gas is concerned, and when of durable constructions and not too great first cost would form an efficient substitute for the ordinary bat wing, fish tail or even argand burners now in use. The heated air supplying the flame gives more perfect combustion, and the higher the incandescence to which the small particles of carbon in the flame are brought the greater will be the light produced. The gas glow lamp is said to be economical in the consumption of gas per unit of light produced, or candle-power, but this fact, though we would not deny it, is not so patent as in the case of the regenerative lamp. We think the glow lamp is more entitled to patronage because of the white and steady light which it gives than for any other reason. Statements are also made in their favor that when used with electric lights a uniform white light is obtained instead of the alternating yellow and white lights so distressing to the eyes and so confusing to the sense of color.

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A CORRESPONDENT from St. Louis declares that that city is experiencing the inconvenience of a cast-iron building ordinance enacted by the politicians without regard to a proper consideration for the interests of the general public. One of its unique provisions, to which our correspondent directs particular attention, is that no permit shall be given for a building any portion of which projects over the building line of the street or alley in which it stands, except "a balcony at the second floor, projecting not more than 3 feet" This provision is interpreted very much according to the humor of the official inspector, who, it is said, sometimes refuses permission to build a bay or oriel window at the second floor or higher, even if the projection is much less than the limit named, while, on the other hand, he allows the construction of cornices occurring at any hight and projecting any amount. Our correspondent asserts that the law serves principally as a terror to the timid and peace loving, while it is constantly violated by more aggressive house owners. He asserts that apparently the authorities are too conscious of its inconsistencies to care to test it before the courts with a resolute antagonist.

WORKMEN ENGAGED in roofing cannot be too careful with reference to the supports used in their scaffolds. A number of serious accidents are on record growing out of this particular. A recent one occurred in Wallingford, Conn. Five men were at work on the roof of the new factory of the Domestic Company; as a heavy bundle of shingles was being pushed along the supports gave way and the men began to slide down near the edge of the roof. Three of the men were fortunate enough to save themselves, but the other two fell to the ground below, a distance of 40 feet. One of these was so severely injured as to die in 10 minutes afterward, while the other escaped without any broken bones, and soon recovered sufficiently to walk home.

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ANY ONE WHO critically examines recent galvanized-iron work put up in this city, whether on business buildings on the prominent avenues or on residences on the side streets, will be impressed with the increasing use of stamped and cast zinc ornaments. A number of cornices on buildings to which our attention has been specially called are quite elaborate in this respect, indicating a marked change in the character of the designs which architects are employing. For a while everything was severely plain, the little galvanized iron that was used being in many instances restricted to forms that were the equivalent of pressed-brick work. The change that has occurred is in the direction of wider projection of cornices, more elaborate moldings, and the free use of enrichments on the moldings, with leaves, shells and rosettes on the brackets and modillions. This change in architectural styles, which seems to be manifested in various directions, cannot fail to have an appreciable effect on the sheet-metal working trades.

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WE LEARN from St. Louis that the building business has been somewhat dull in that city throughout the year. A number of large undertakings have gone forward, but they were for the most part inaugurated before the close of last year. The dullness has been more perceptible in the absence of small buildings, which is largely attributable to the strikes of last spring and the resulting conflict between the labor organizations and the authorities. The labor difficulties of last spring seem to affect St. Louis and the country tributary to it more severely than any other section. The prices of building materials are lower at present in St. Louis than they have been for many years past. This, it is argued by our correspondent, is likely to lead to a large amount of building in that city for the coming year. The low prices are in part due to the dullness in business of all kinds, owing to the labor disturbances in the earlier part of the year. With these difficulties removed and with the increasing demand for building which a growing city like St. Louis constantly experiences, it may be anticipated that the coming year will develop more activity than any time in the past. It is to be hoped that no further labor disturbances will arise to obstruct building enterprises.

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THE DURABILITY of shingle roofs is presumably a matter in which our readers are interested. There are perhaps not many shingle roofs which will compare with that which the eccentric preacher, Lorenzo Dow, put on his house in Montville, Conn., 65 years ago. The house itself, though still occupied, is quite infirm; but the shingles on the roof, according to the testimony of the inmates of the dwelling, are apparently as sound as when nailed to the rafters, somewhere about 1820. Lorenzo Dow drew the shingles in his ox cart from the Connecticut River, and put them on the house with his own hands. They were rived and planed and jointed by hand, and the marks of the clamps in which they were held while being dressed are still plainly visible. This is said to be the oldest shingle roof in the State, and as none are either rotten, punky or missing they are supposed to be good for another 60 or 70 years of service, even if they do not quite last, as Lorenzo Dow is said to have intended they should, "to the day of judgment, or thereabouts."

## THE PLATES.

In plate XLI we illustrate a house which has recently been erected on Palisade avenue, West Hoboken, N. J. The owner is Mr. W. Reid, and the builder, who is also responsible in part for the planning and design, is Mr. John White. The first of our engraving shows the external appearance of the house, and the other two views from the parlor, one looking through the entrance hall, and the other through the dining-room into the bay. On page 210 we present the floor plans of this building, which are somewhat peculiar, and in the parlor is shown the position of the artist's camera in taking the two interior views above alluded to. Our engravings in the plate were made direct from photographic negatives, without the intervention of a pen drawing, and are of interest to our readers not only on account of illustrating a very pretty interior in a moderate-price house, but also because they show the perfection to which direct processes have of late been brought. Referring to the house, we learn from the owner that the very best of material has been used throughout in its construction. The outside walls are sheeted, the sheeting being placed diagonally. Over this a cover of building paper was placed, and outside of this in turn the weather boarding. The front vestibule has a tile floor, and a tile hearth also occurs in the parlor. The mantels of the first floor are of slate. The house is plumbed throughout in a very careful manner, and is also piped for gas. There are two stained-glass windows, and stained glass is also used in the outside front doors. The windows are provided with window screens, including the windows in the conservatory. The outside shingling of the gables is done in California redwood. The cost in round figures was $3000.

In plates XLII, XLIII and XLIV we show a house design by Oliver Everett, of 1912 Webster street, San Francisco, Cal. The foundation plan and section are given on page 209. In the specification accompanying this design the author presents some particulars concerning how the house would be built, if required for use on the Pacific Coast, that may be of interest to our readers. Oregon pine timber would be used for the frame, and California redwood for the siding and inside finish. On the Pacific Coast only the best class of houses are double boarded, the mildness of the climate rendering such precaution unnecessary. Referring to his estimate the author says that he has included in it the cost of a hot-air furnace, although such apparatus is usually dispensed with in the section of the country named. The basement of cellar walls, the author says, he would build of concrete unless building stone was obtainable at cheap rates. The attic has been designed to be left unfinished, but rough studded. In case additional rooms are required, two or three spacious chambers could be finished off in this part of the house. With reference to the main rooms and hall of the lower floor, the author says he would finish with panel wainscoting. The bookcases in the library should be designed to match the finish of that room. The inside woodwork he would finish in its natural color and grain. The author's estimate of cost is $5775. He adds that, inasmuch as labor is cheaper in various sections of the country than it is in San Francisco, it is possible that this figure could be shaded in different localities.

## Chimney Construction.

BY C. POWELL KARR, C. E., CONSULTING ARCHITECT.

(Continued from page 190, October issue.)

By the term "stability," as applied to a chimney, is meant the property of remaining in equilibrium without sensible deviation of position either from certain deviations of its own load or an externally applied force, and the moment of stability of any body is the relation of forces which tend to produce or destroy equilibrium in that body, and this relation is generally expressed by an equation of the opposing forces. From the practical point of view the important part of the calculation is to ascertain the location of the "center of pressure" for any given joint in the masonry, for any given external load; this point, the "center of pressure," is located at the point where the opposing forces just balance each other, and their "moments" are then said to be equal.

The deviation from position owing to improperly constructed foundations or injudicious bricklaying we will consider under the head of general remarks. It is necessary that chimneys should be constructed of such a weight, form and section that they may be able to withstand the lateral pressure of the wind. The greatest pressure of the wind the external surface will be exposed to is assumed to be 55 pounds per square foot. The intensity of this force is assumed to be concentrated at the center of gravity of the vertical section of the chimney; the total pressure against this surface in foot-pounds is equal to the area of the vertical section multiplied by the intensity of the force per square foot, and the moment of pressure is this total pressure multiplied by the perpendicular distance of the center of gravity of the vertical section from the plane of the joint, along which the applied thrust tends to overturn the structure.

To balance this force which tends to overturn or move the chimney from its position we have the weight of the chimney multiplied by the horizontal distance of the center of pressure from the foot of a vertical line which passes through the center of gravity of the structure, "the horizontal distance" lying in the plane of the joint about which the forces act. In other words, the moment of a force, with respect to a neutral axis, is the product of the force into the lower arm, through which it acts at right angles to that axis

The moment of stability of the chimney at its weakest points have been calculated. Formulated the moment of the forces reads: $F A C = Wl$, in which $F$ is equal to the intensity of the pressure of wind, or 55 pounds per square foot; $A$ = the area of the diameter of vertical section above the joint about which the force acts, and $C$ the center of gravity of the same vertical area. $W$ is equal to the total weight of the structure above the joint in pounds, and $l$ is the length of the lever arm, in feet, through which the weight acts to counterpoise the overturning or rotating force. At the joint A B the data are; $F$ = 55 pounds per square foot; $A$ = 426.35 square feet; $C$ = 30.6 feet; $W$ = 246,902.2914 pounds, and $l$ = 2 feet 9 inches; therefore we have:

$$55 \times 426.35 \times 30.6 = 246{,}902.2914 \times 2.9,$$

or 717,547.05 = 717,547.05 nearly.

By interpreting this result we see that the center of pressure, or resultant of the opposing forces, passes through the plane of the joint at a horizontal distance of 2 feet 9 inches, or 2 feet $10\frac{5}{16}$ inches from the center of magnitude of that plane, or 1 foot and $1\frac{13}{16}$ inches from the outer edge of the chimney on that plane. At C D the center of pressure is at 2 feet $4\frac{7}{16}$ inches from the center of magnitude of the plane of the joint, or 1 foot $1\frac{9}{16}$ inches from the outer edge of the chimney. At E F it lies 1 foot $6\frac{7}{8}$ inches from the center, or 1 foot $5\frac{5}{8}$ inches from the outer edge.

And at G H the center of pressure and center of gravity coincide, which means simply that the weight alone of the chapter is greater than the force of the wind in foot-pounds to rotate or overturn it. The center of gravity of the chimney exclusive of the chapter was found in the ordinary way, that of the chapter was determined graphically by means of the funicular polygon, and the resultant of the two, or the center of gravity of the whole chimney, was calculated by means of the formula of Professor Rankine, which reads that the perpendicular distance of the common center of gravity of two or more bodies, with respect to any axis in the given plane, is equal to the sum of the moments of the two bodies, with respect to the given axis, divided by the sum of the weights of the bodies, or as applied to the chimney; the moment of the chapter, with respect to the plane of the basal joint, is the distance of its center of gravity from that plane multiplied by its weight, and the moment of the balance of the chimney, referred to the same plane, is the distance of its center of gravity from that plane, multiplied by its weight; the two bodies being symetrically disposed about a line joining their centers of magnitude, their common center of gravity will lie somewhere on that vertical line. Thus:

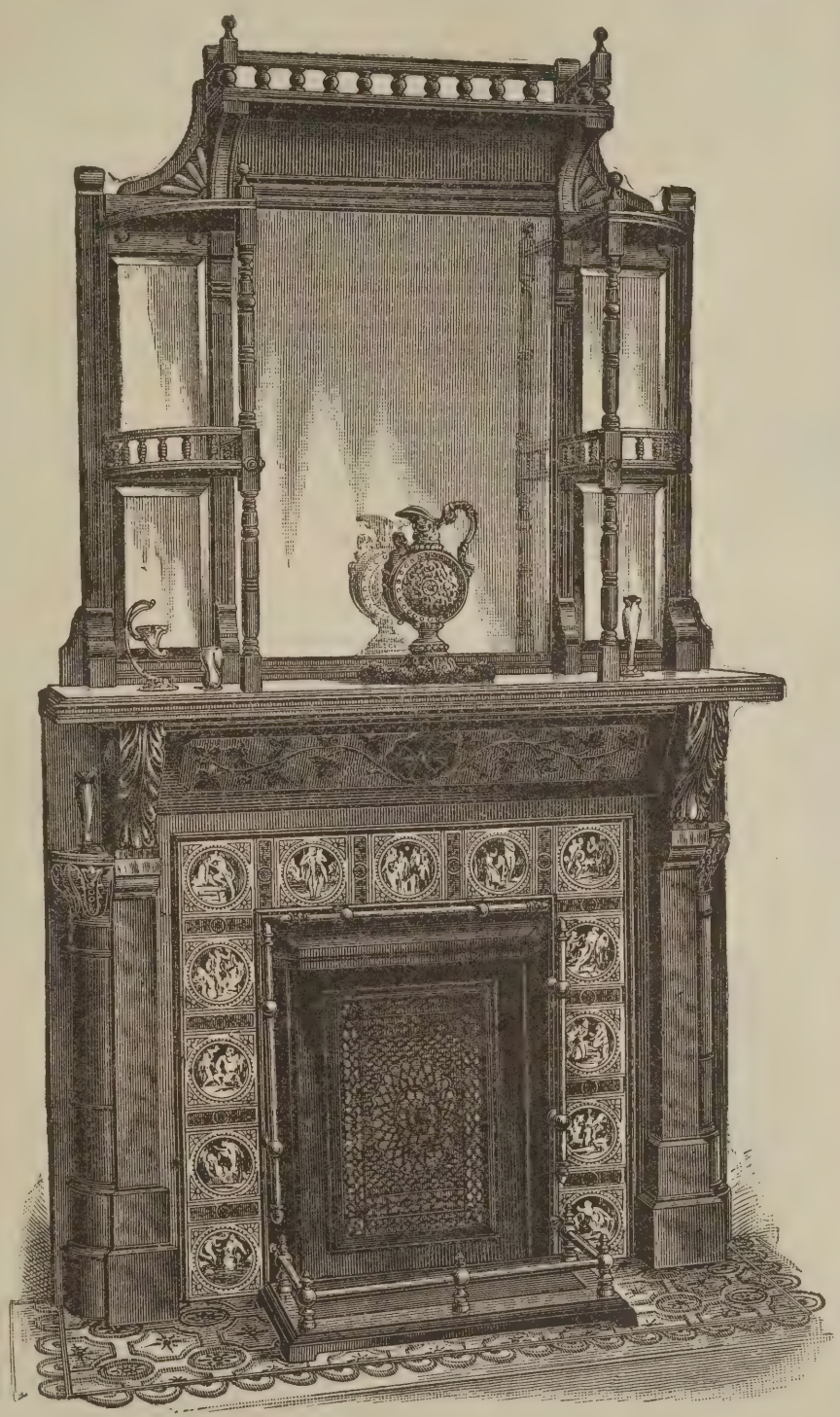
By graphical construction the center of gravity of the chapter was found to be 3.5312 feet above G H (see detail drawing), and of the balance of the chimney 27.693 feet above A B; therefore the vertical distance of the center of gravity of the chapter ($g$) above A B is 63.5312 feet. Let ($w$) = weight of 1 cubic foot of brick masonry = 118 pounds (Trautwine); let ($c$) = cubic feet of masonry in the chapter, and C the cubic feet of brick masonry in the balance of the chimney, A B H G (see drawing vertical section); let G = center of gravity of the section of the chimney denoted by A B H G; and let $x$ = distance of the common center of gravity from the plane of A B; then we have

$$x = \frac{C\,w\,G + c\,w\,g}{C\,w + c\,w} \text{ or}$$

$$\frac{(1923.382 \times 118 \times 27.693) + (169.0103 \times 118 \times 63.5312)}{(1923.382 \times 118) + (169.0103 \times 118)}$$

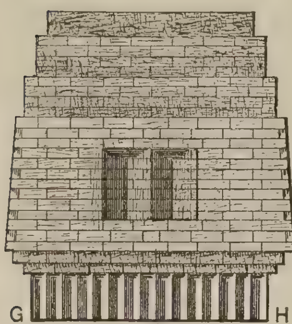
$$= \frac{7{,}552{,}194.097888}{246{,}902.2914} = 30.6 \text{ feet,}$$

or the distance of the common center of gravity from the plane of A B. We conclude from the results that the chimney is in stable

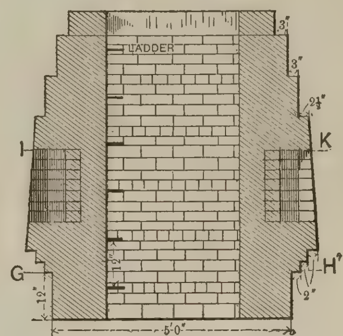


*Design of Mantel Built in California Redwood by M. A. Marshall, San Diego. Cal.*

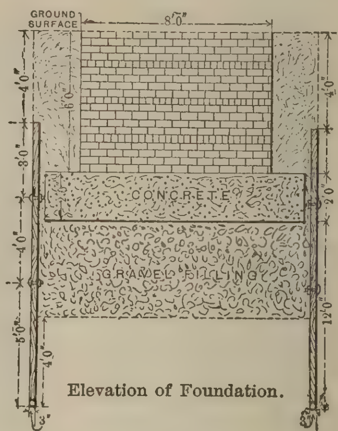
(*See Page* 211.)



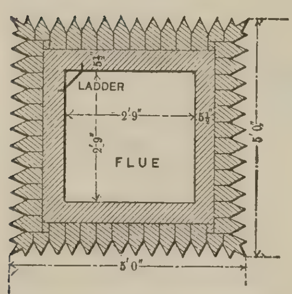

Elevation of Chapter.



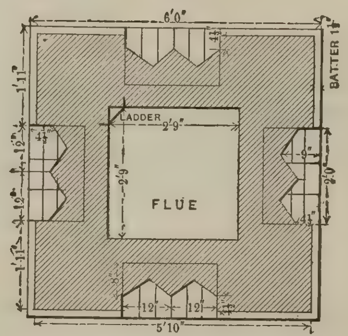

Vertical Section Through Chapter.



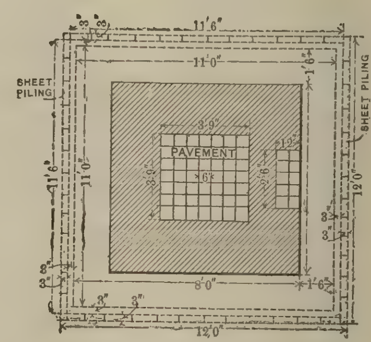

Elevation of Foundation.




Section Through Shaft Near Top.

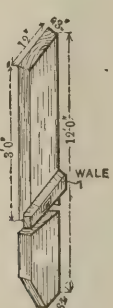



Section Through Shaft Near Bottom.

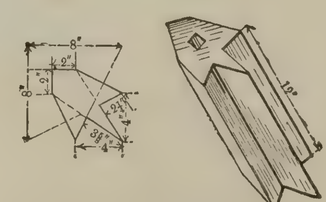



Plan of Foundation.

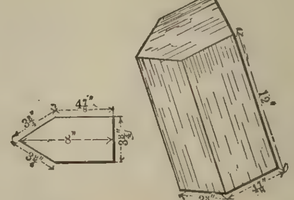
Cramp.




Wale.



Special Corner Brick.



Special Face Brick.

*Details of Chimney Construction.—Elevations and Sections, ⅛ Inch to the Foot.—Details of Brick, &c., ¾ Inch to the Foot.*

equilibrium. The joint of least stability is at A B, but, as the resultant of the forces lies over 1 foot within the base, on every side the provision for stability from the force of the wind is ample.

The total weight of the chimney above the concrete footing is 292,214.29 pounds. The pressure on the concrete is therefore equal to about 2.28 tons per square foot, or 31.7 pounds per square inch. Brick crushes at from 450 to 600 pounds per square inch, and cracks at from 225 to 300 pounds per square inch, and we have therefore a factor of safety of, at the very lowest, 7, which is ample for ordinary contingencies.

In most handbooks the weight of a cubic foot of common brick masonry is stated to be 112 pounds, but this statement is misleading; it is taken as a general average, with no conditions given. In order to know what a cubic foot of brick masonry will weigh it is first necessary to know what proportion of the cubic foot of masonry is brick and what is mortar. To do this we must know the thickness of the mortar joint. To make a fair average weight this cubic foot must be regarded as a foot inclosed in a solid mass of masonry, so that the amount of mortar it shall contain will not be underestimated.

In the case before us the specifications call for a ¼-inch joint; the brick are North Rivers, and are 8 inches long, 3½ inches wide and 2¼ inches thick, and the contents of a brick are equivalent to 63 cubic inches. If laid with mortar, ¼-inch joint, bed and sides, each brick will occupy 77.34 cubic inches, and will therefore contain 14.34 cubic inches of mortar; the percentage of mortar is therefore 18½ per cent. of the mass, and not considering unavoidable spaces there would be 319.68 cubic inches of mortar in 1 cubic foot of masonry, and 1408.32 cubic inches of brick. Now, brick such as good, hard-burned North Rivers will weigh 125 pounds per cubic foot, and hardened mortar, according to Mr. Trautwine, will weigh 103 pounds per cubic foot. Therefore the mortar in the cubic foot weighs 19 pounds, and the brick itself 102 pounds nearly; consequently 1 cubic foot of brick masonry must weigh the sum of these weights, or 121 pounds; but allowing about 2½ per cent. for voids and light weight or defective brick, we would have as a fair average weight 118 pounds per cubic foot, and this is the weight we have chosen as a basis of the calculations in regard to the stability of the chimney.

No allowance was made for the difference of weight between common and fire brick and their respective mortars and difference of joint owing to the probability of the use of extra-burned brick in the place of fire-brick. And we will proceed to show that for the small amount of brick to be used it would make no material difference. Fire-brick of regular size and standard make weigh 137 pounds per cubic foot; its mortar fire-set weighs on an average 120 pounds. The size is 9 x 4½ x 2½ inches. The contents of one brick are 101¼ cubic inches. To be laid on every face but one with ⅛-inch joint of mortar. Even closer than this is good practice for fluework. By estimation we find to lay one brick as stated top and bottom joints will be 9⅛ x 4⅝ x ⅛ = 5.28 cubic inches; back face, 9⅛ x 2½ x ⅛ = 2.85 cubic inches; two ends, 2½ x 4½ x ⅛ = 1.41 cubic inches. Total, 9.54 cubic inches mortar. Brick and mortar together, 110.79 cubic inches. Percentage of mortar, 8.6 per cent. The cubical contents of the fire-brick shells, both lower and upper, are by the prismoidal formula 228.75 cubic feet; weight of brick alone is, therefore, 209.08 × 137 = 28,643.96 pounds; the mortar, 19.67 × 120 = 2360.4 pounds, or a total weight in round numbers of 15½ net tons. The weight of an equal mass of common hard-burnt brick laid with ¼-inch joints at 118 pounds per cubic foot is about 13½ net tons; so there is a gain of about 2 net tons in using fire-brick. This additional weight would move the resultant center of pressure only ½ inch nearer the center of magnitude, a result that is practically immaterial to the safety of the chimney, and the hard-burnt brick can be used, so far as stability is concerned, with safety, but the difference is shown for the purpose of illustrating how a chimney may be made heavier at its base, and therefore safer, when it is impossible to find room enough for a broad base of common brick. Where it is necessary to make a chimney base heavier for a certain distance good concrete in vertical layers between brick walls is a good substitute. As it weighs from 130 to 160 pounds per cubic foot and costs from $5 to $9 per cubic yard, its efficiency will be at once apparent. It should be protected from heat to render good service.

(To be continued.)

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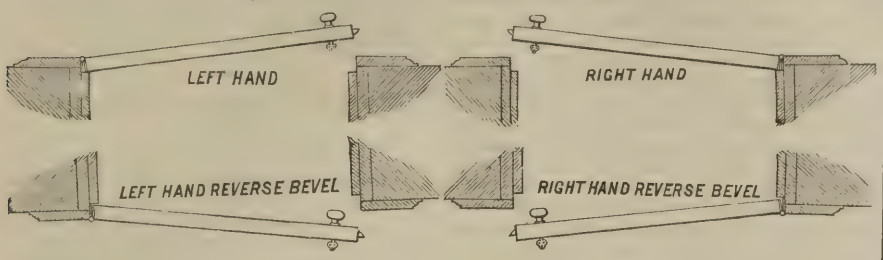
A great deal of pride is expressed by the average Charlestonian at the escape of the Custom-House building. This structure of granite is much the handsomest and most stable of any in the city. An examination by officers fails to reveal any serious injury. The quakes appeared to have moved this building about an inch, and the only effect noticeable is in a very few cracks at joints, or rather gaps between the granite blocks.

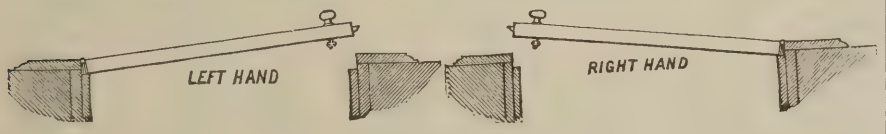
## The "Hand" of Door Trimmings.

In reviewing a catalogue of Chas. A. Strelinger & Co., of Detroit, Mich., a short time since, we referred to illustrations contained in it showing the "hand" of locks, latches and butts. As the subject is of considerable interest to a large class of our readers, we now reproduce some of the cuts used at that time in which the "hand" of mortise locks, rim locks and butts are clearly indicated, and in such a way as to facilitate orders. Of mortise locks right and left hand are shown, and also right and left reverse bevel. The same varieties of rim locks are illustrated, and right and left hand butts are also shown. Numerous mistakes occur in ordering and shipping goods of this class, and Messrs. Strelinger & Co. have done the trade a service in attempting to reduce the matter to a definite system.




*"Hand" of Door Trimmings.—Right and Left "Hand" of Mortise Locks.*

Another matter concerning which many misundertanding in orders arise is that of the bevel of doors. The larger cut on this page shows a method of measuring the amount of bevel, and is also one of the illustrations from the catalogue above referred to. In ordering locks for beveled doors it is necessary to state the bevel. In their directions to customers Messrs. Strelinger & Co. say: "In ordering locks for doors with special bevels give the whole thickness of the door as measured by one arm of a square, and the amount of the bevel as shown on the other arm. In the example we illustrate the bevel is ¼ inch in a thickness of 2¼ inches.




*Right and Left "Hand" of Butts.*

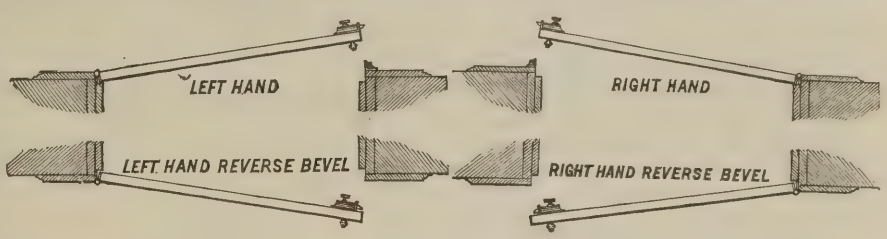
## Should Dwelling-Houses be Plumbed?

A short time since the following letter was printed in the *Evening Post*, of this city, under the heading "The Danger of 'Sanitary Plumbing'":

*To the Editor of the Evening Post.*—SIR: The science of plumbing is not an exact science. Experts disagree both in system and workmanship as to good or sanitary plumbing. All "practical plumbers" advise and are ready to execute in the most intricate and expensive manner the introduction of the insidious deadly poison of sewer gas into the bedrooms or the adjoining closets of every man's house, placing between the family and sickness or death a half-teacupful of water in a trap. Professional medical experts have said that water in a waste-pipe trap changed every two hours will not permit the passage of sewer gas. If this is true, then one's little children put to bed at 8 p. m. in a bedroom handsomely fitted with hot and cold water, silver faucets and decorated porcelain will commence at 10 o'clock to breathe the foul gases generated by sewer filth, and continue to do so for the next eight hours.

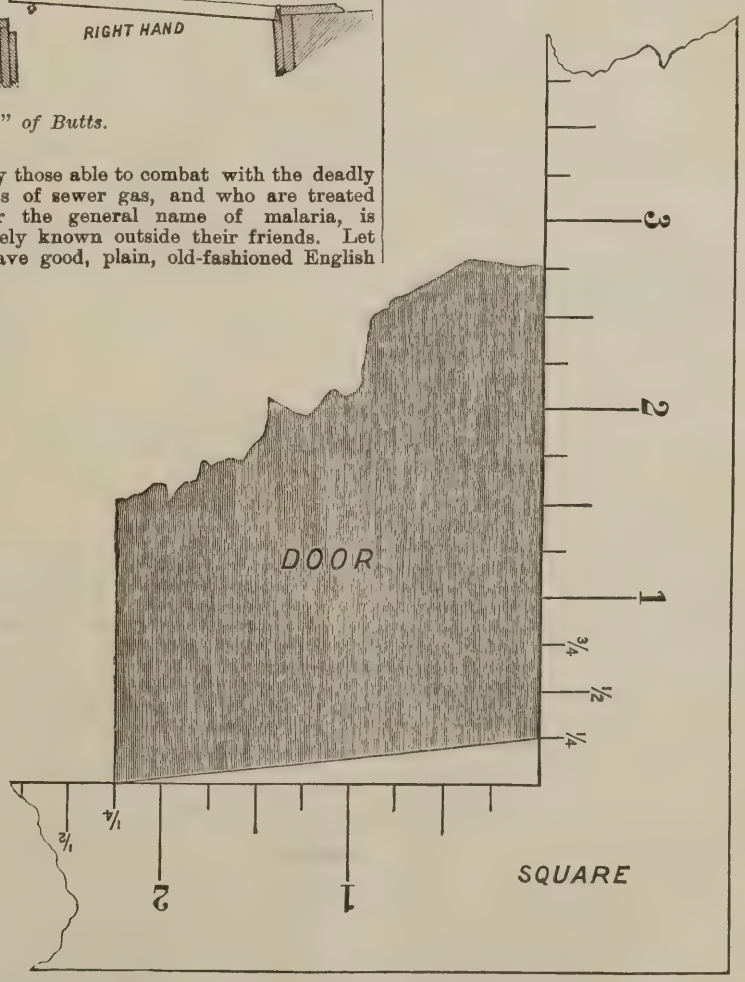
But the fact probably is that water will not at any time prevent the steady flow of sewer gas. Sewer gas rises, expands, presses; it constantly generates and must have space, and so far as all appliances yet known to the plumbing trade under the head of sanitary plumbing, as back air or direct ventilation, go, no absolutely safe plan has yet been devised by which water and waste can be introduced into any bedroom or adjoining closet and the health of its inmates be unimpaired. If weekly deaths from low, slow, intermittent and highclass-fevers, diarrhœas, diphtheria, &c., could be gathered and classed under the one head of sewer-gas diseases, we should have some idea of the fatal effects of sewer gas; but the lingering, desponding existence that is led by those able to combat with the deadly effects of sewer gas, and who are treated under the general name of malaria, is scarcely known outside their friends. Let us have good, plain, old-fashioned English to express health and death, and say, "sick from breathing bad air," or "dead by sewer gas."

I have lately overhauled a fine house on the West Side, said to have been "the best plumbed house in New York," done by experts, and approved by another, who chalked his name on the ventilating-pipe. The lead was heavy, the joints beautifully "wiped," the silver faucets and marble basins all that could be wished for, and where the pipes were too long they were coiled around under the floor, and thus increased the plumber's bill. The kitchen sink and the washtubs were separately trapped, but the five open marble basins and bath in and adjoining the five bedrooms were all without traps, and with no direct or indirect ventilation. There are four chimneys in the house, and every bedroom fireplace—in fact, every fireplace in the house, but one in the dining-room—had been sealed up and adapted to a furnace register. The waste-pipes from five basins and one bath, when gathered together in one, passed into a 6-inch iron soil-pipe in the cellar, and here at an average distance of 60 feet from basins and bath was a single unventilated pint-of-water trap, which was probably syphoned every hour of the day. Sewer gas permeated the bedrooms, and when completely closed for 24 hours they were filled with a sickening odor.




*Right and Left "Hand" of Rim Locks.*

There is one and only one remedy for this: Strip your bedrooms of all plumbing whatever; let no sewer connection of any kind come into a sleeping-room; go back to the clean, old-fashioned bowl and pitcher, and be content with good health. A house




*Method of Measuring and Indicating the Bevel of Doors.*

to-day that has the best sanitary plumbing is one that has the least possible amount of plumbing in it. Bathrooms and water-closets should be in separate rooms, supplied with the best-known ventilating traps and with direct open-shaft ventilation in addition to pipe ventilation through the roof. The best sanitary plumbing I know of is where the whole of it is put into another building entirely detached from the dwelling-house, and this has been done by an old New York builder in his own home after a long experience with the inexact science of plumbing.

ARCHITECT.

To the above the Editor of *The Metal Worker* replied as follows, his letter being published in a later issue of the *Post:*

*To the Editor of the Evening Post.*—SIR: Will you permit me to correct in your columns the misconceptions of your correspondent "Architect," whose letter on "The Danger of Sanitary Plumbing" appeared in your issue of the 8th inst.? Its statements are misleading, and show an ignorance of which the author, if really an architect, has good reason to be ashamed. It is because so large a proportion of those engaged in practice as architects are ignorant of the first principles of the mechanics of hygiene that so much bad plumbing-work is done in dwellings and public buildings. There are very few architects who can plan a job of plumbing-work and write the specifications for it correctly. Some of those who have gained a reputation in this line employ practical plumbers to prepare their specifications. As a rule, however, the architects prefer to do this part of their work in the usual perfunctory way, with the result that it is rarely possible to carry out their plans in practice or work to their specifications. Out of many hundreds of plans and specifications for plumbing-work which I have had opportunity of examining I have not seen a dozen which were practicable and correct except those prepared by sanitary engineers or practical plumbers. In their knowledge of conditions affecting the healthfulness of dwellings the plumbers have been wiser than the architects for at least a quarter of a century, and perhaps longer.

Your correspondent, having made the discovery that plumbing-work in which all the conditions of safety are omitted is liable to introduce bad air into a house, makes the mistake which the late Dr. Frank Hamilton and others have made before him, and urges that all the plumbing conveniences of the modern house should be banished, since the healthfulness of a dwelling is in inverse ratio to the number of fixtures and lengths of pipe it contains. He commends as the best practice he has seen the entirely impracticable plan of putting all the fixtures in a separate and detached building—an English idea, which has been for many years taught in the doctrinaire school of sanitary science. In my judgment the general distribution of hot and cold water through a house, with baths and closets as numerous and convenient of access as the purse of the owner will afford and the architectural arrangement permit, is in the largest degree conducive to comfortable living; and the person who cuts himself off from the enjoyment of these luxuries shows a degree of intelligence comparable to that of the man who should refuse to have fires in winter because the gaseous products of combustion are deleterious to health. The sensible man expects these products to go up his chimneys and find an outlet in the upper air. If disappointed in this he would conclude that something was wrong with his flues, and not that his life and health demanded that he should abolish furnace and fireplaces and get along without artificial heat.

It is not true that among those entitled to recognition as experts in the mechanics of hygiene there are any important differences of opinion as to the methods of securing immunity from the dangers incident to bad plumbing-work. There are no mysteries in plumbing which an architect of average intelligence could not fathom in 10 days, if willing to take counsel of those who know more than he does. One who follows the lead and heeds the teachings of agnostics, quacks and cranks in any line of thought or investigation may easily become confused; but because there are some who claim a wisdom above what is written, the sensible man has no occasion to doubt the truth established by human experience. The facts as regards plumbing-work are that, where it is properly done in accordance with the accepted rules of good modern practice, as many fixtures as convenience demands may be employed with entire immunity from any evils incident to their presence in a dwelling. When it is not properly done the danger is in proportion to the seriousness of the mistakes in plan and execution. The same is true of furnace heating and of a thousand other things. The inside of a pipe should be like the inside of a chimney—a channel for what is intended to pass through it, and one from which nothing escapes, except where it is intended to be discharged. Not only is this possible, but it is attained easily and cheaply, and by methods with which all concerned—except possibly the architects—are familiar.

With good plumbing we should have good ventilation; so, for that matter, should we have it with no plumbing at all, and still more with bad plumbing. A close sleeping-room full of stagnant air is likely to be unwholesome, whether it contains a set basin or the primitive bowl and pitcher. Our friend the architect seems to have forgotten that ventilation is needed at all, and the places where it is sometimes prescribed that plumbing fixtures shall be placed make even the plumber open his eyes in astonishment. It is well to look at this matter from a common-sense standpoint. We must not confound a good thing with the possible abuses incident to its unintelligent enjoyment. Health, happiness and comfort are all promoted by the enjoyment of the conveniences which civilization has provided. Elements of danger in connection therewith are easily avoided and easily corrected, and, if our friend the "Architect" does not know how to plan anything he is sure of except a corner in which to place a stand for a bowl and pitcher, I should advise him to acquaint himself with the means by which safety in plumbing-work is easily attainable.

J. C. BAYLES.

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The square between Whitehall, Moore, Pearl and Water streets, formerly occupied by the old Produce Exchange, is now a huge excavation, in which vast numbers of long piles are sinking into the marshy earth to support the foundations of the United States Army building that is to occupy this site. The frontage of the new edifice will be 104 feet on Whitehall and Moore streets by 92 on Water street and 72 on Pearl street, and its hight eight stories above ground.

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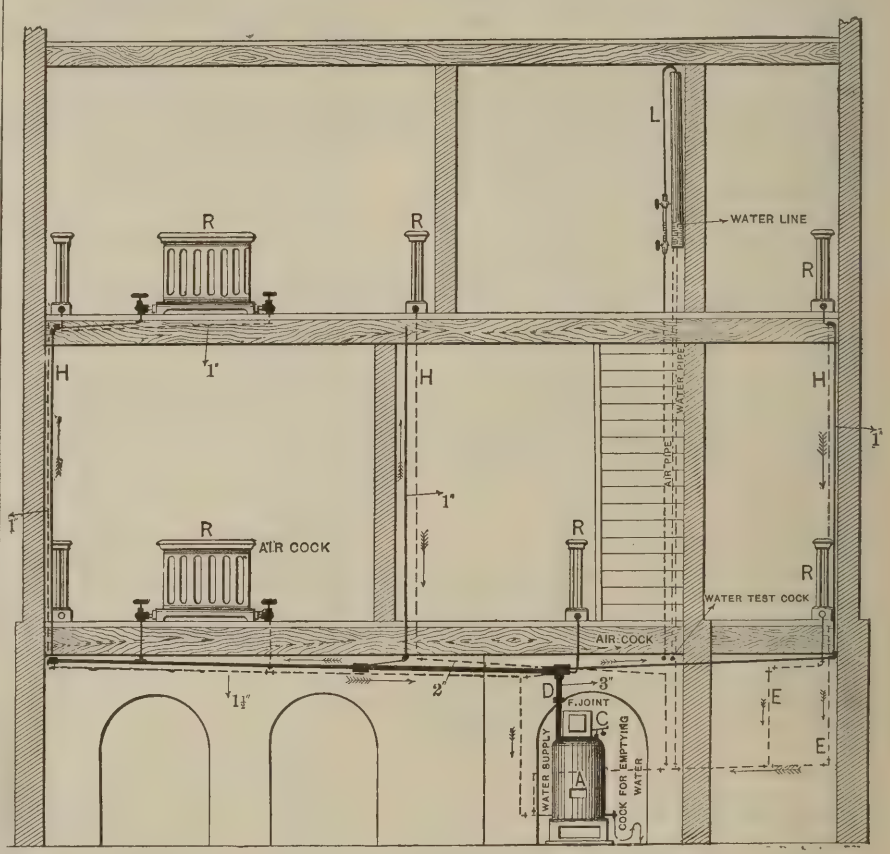
## The Mahony System of Hot-Water Heating.

We recently published an illustrated description of the Mahony system of steam heating as presented in the catalogue newly issued by M. Mahony, Troy, N. Y., and 85 Centre street, New York City. From the same source we take the following account, with illustrations, of the Mahony system of hot-water heating:

The chief advantages of hot-water heating are that circulation begins and heat is given out by the radiators in use as soon as any heat is imparted to water in boiler, whereas with steam a temperature of 212° is required to make steam, and this temperature must be maintained or the radiators will become cold. With a slow fire, which would be insufficient to produce steam, and would be entirely wasted in a steam apparatus, the raditors of a hot-water apparatus may be kept at a temperature much below the boiling point and yet sufficiently high to impart an agreeable warmth to the rooms in mild weather, while, by opening the dampers, any degree of heat required may be obtained. Thus the effect of every pound of fuel burned is felt in the house, and a much wider range of regulation is possible than with steam. There are two systems of heating by hot water, viz.: High temperature and low temperature water heating. With either system direct or indirect radiation, as described for steam, may be used. (See *Carpentry and Building* for October, page 198.) The main or cellar pipes in a water-heating apparatus require particular attention. The flow-pipe should ascend from the boiler and the return descend to it. In branching from or to main pipes Ys should be used, and long-bend elbows where elbows are required. There should be a continuous circulating-pipe, so that, if all radiators are




*The Mahony System of Hot-Water Heating.—Fig. 1.—Sectional Elevation.*

shut off, circulation in connection with the expansion-pipe will take place.

HIGH TEMPERATURE.

In a high-temperature water apparatus the expansion pipe, which is closed, is placed at the highest point of the apparatus, and to it is fitted an air-pipe with test-cock in some convenient position, a water-gauge with glass, and a water-test cock by which the hight of the water in the apparatus is ascertained. Air-cocks should be attached at other points and on all radiators, so as thoroughly clear the apparatus of air when filling it with water at the starting. There is also a supply-valve for filling the apparatus at the boiler, as well as a valve to empty the whole system when desired. The supply-pipe is connected with water tank in attic or with town pressure pipes.

LOW TEMPERATURE.

In the low-temperature water apparatus the difference to the apparatus just described is the expansion-pipe. In this apparatus an open expansion-tank, also at the highest point, is used, and water supply is through this tank. The other pipe arrangements are the same, except that with the low-temperature apparatus more heating surface in the radiators is required than in a high-temperature apparatus. On account of the slow circulation and comparatively low temperature given by this system it is desirable to use large pipes.

EXPANSION PIPE OR TANK.

Water, when heated, expands one-twenty-third of its volume; this expansion is allowed for by a pipe or tank large enough to receive the increased volume of water. The extract internal capacity of this pipe or tank is therefore one-twenty-third of the internal capacity of boiler, radiators, coils and all pipes in the apparatus. In low-temperature or open-circulation apparatus tanks from 5 to 10 gallons in capacity, and in high-temperature or closed-circulation apparatus pipes 4 inch to 5-inch diameter and from 8 to 10 feet long, are approximately the sizes generally used.

SIZES OF FLOW AND RETURN PIPES IN HOT-WATER APPARATUS.

It is desirable to have both main and flow return pipes equal in area to the combined area of branch pipes. These branch pipes are usually 1-inch to conform to the practice of manufacturers who provide their radiators with 1-inch openings. Separate flow and return pipes from each radiator or coil to main pipes are preferable to branches from rising lines. Horizontal pipes may with advantage be one size larger than vertical pipes. Flow and return pipes in water apparatus are the same size. Gate-valves should be used; angle-valves according to their positions may sometimes be applied. Vertical return-pipes too close to boiler are liable to impede proper circulation by reversing the flow; a few feet of level horizontal pipe near boiler is desirable.

GENERAL REMARKS.

With either system each radiator may be fitted with a flow and return valve, though the latter is often dispensed with, as the flow-valve impedes circulation sufficiently to lower the temperature of radiator. In all water-heating apparatus care should be taken to see that all flow and return-pipes are regularly inclined in the proper direction, as the slightest dip or trap will impede, and sometimes completely stop, circulation. Errors of this kind frequently cause great trouble and inconvenience. When the circulation is not free waste of fuel results, and not infrequently the boiler is condemned as of insufficient capacity. Horizontal coils and pipes are not desirable for house heating. Vertical radiators and pipes are always preferable, as they give more rapid and freer circulation.

We present in Figs. 1 and 2 a sectional elavation and a cellar plan of a residence heated with hot water by the Mahony system of direct radiation. The total capacity of the appartments heated is 12,000 cubic feet. and the total heating surface of the radiators is 227 square feet. There are eight radiators employed, four on each floor, as shown in the cut. The following letters of reference refer to both of the accompaning cuts: A, circulating boiler; B, smoke-pipe with damper; C, safety valve, lever and weight; D, main, flow and branch pipes; E, main, return and branch pipes; F, circulating flow and return pipes; G, connection to expansion-pipe; H, vertical flow and return pipes to radiators on second floor; K, flow and return pipes to radiators on first floor; L, expansion-pipe with water-guage, water-test pipe and cock, and air-pipe and cock: R, radiators. The sizes of the pipes and their general arrangement may be seen by reference to the diagrams.

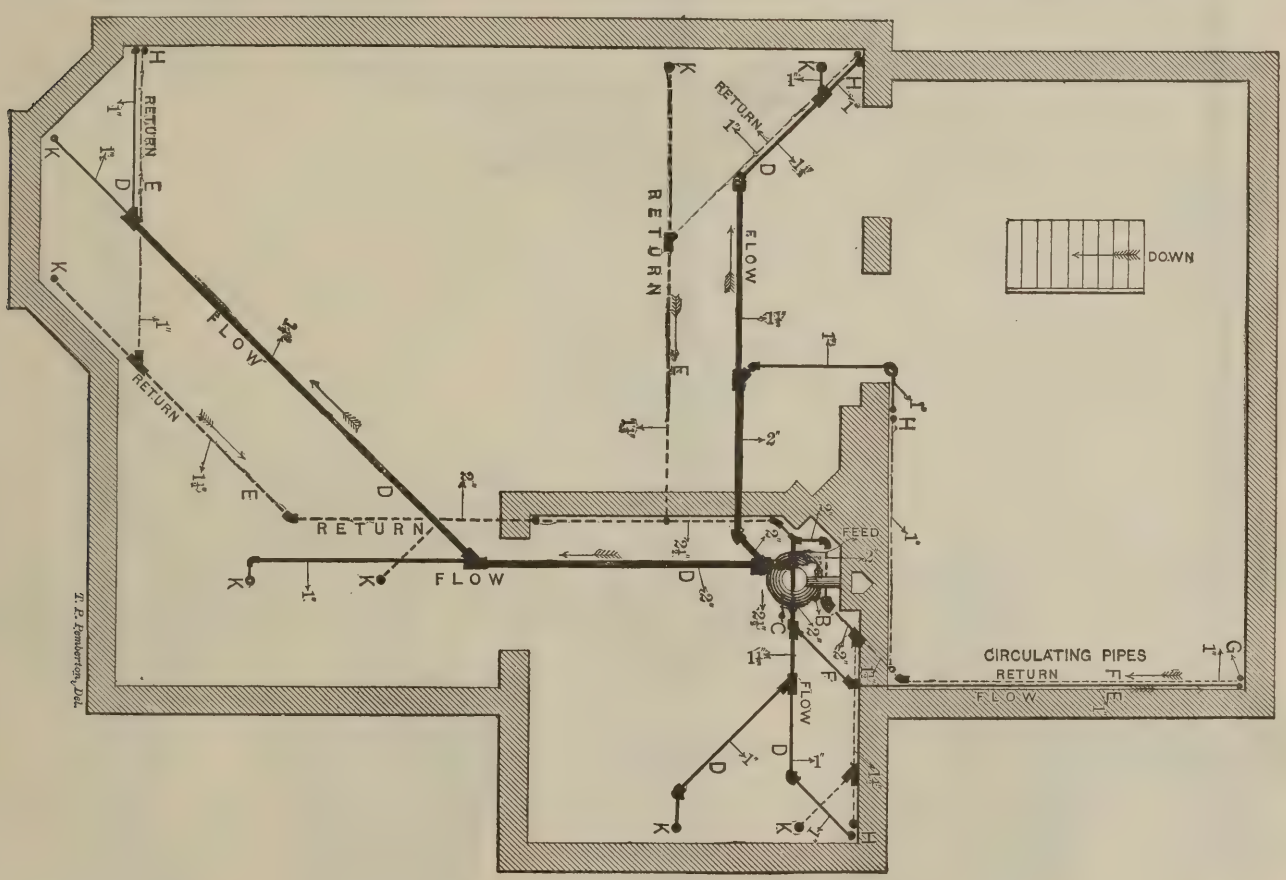



*Fig. 2.—Cellar Plan.*

## Mullion and Tracery.

Professor Willis, says: The familiar terms mullion and tracery seem to be traced no higher than to Sir Christopher Wren. The original form of the former word (sometimes written munnion) seems to be *monial*, derived from the French *moyen qui est au milieu*, the old form of which is *meian* or *menel*. They are called *menaux* or *croisillons des fenêtres* in that language. These words (mullion and tracery) were adopted by Bentham and Milner, both evidently deriving them from Wren, from whom they quote largely with admiration. Dr. Plot, his contemporary, also uses the word, and from these authorities the words derive their present universal employment. Other early antiquarians make use of awkward circumlocutions for tracery. Thus Wanton, one of the first admirers of Gothic architecture, can yet find no better terms for this beautiful and characteristic principle of decoration than "ramified windows divided into several lights, and branched out at the top into a multiplicity of whimsical shapes and compartments." But soon after he introduces a description of "fretwork thrown like a web of embroidery over the old Saxon vaulting of Gloucester." Instead of tracery, every mediæval account relating to windows contains an abundance of stones called form pieces, and allusions to forms, which, as I shall proceed to show, was their proper word for the tracery. In France the stone frames of Gothic windows are to this day termed *formes de vitres*, forms or seats for glass; for, as is well known, the word form (pronounced with the long *o*) bears, among others, the sense of a seat or receptacle, as a long bench or the seat of a hare. Bailey defines form (in mechanics) to be a kind of mold whereon a thing is fastened or wrought, and we have examples of this in the printers' form of types. In French and in the mediæval Latin the stalls of a choir are so termed, and the French use it for a dry stone dock.

## Insufficient Timbering.

Modern builders, says Mr. J. Lemon, in writing upon this subject, have found out that the element of strength in a beam is the depth, and they have carried this principle to such an extent that we now see boards on edge made to answer as joists. I do not so much object to the deficiency in thickness in joists if they are well strutted as to the want of sufficient depth in proportion to the span. Many persons are so ignorant of the strength of timbers that they have a stereotyped scantling for joists, which they use for all spans in small houses. The result of such a system may be easily imagined; in some cases they have more than sufficient and in others the deflection is considerable. Of all portions of timbering there are none so often scamped as the lintels, and when we consider the small proportion they bear to the total quantity of timber in a building it is surprising that men will injure the stability of a structure by crimping their scantling.

## Roof Ornaments.

The accompanying designs of finials represent current practice in German work, and are taken from a volume relating to sheet-metal work published some time since by F. Stoll, Jr., of Stuttgart, the editor of the *Illustrirte Zeitung für Blechindustrie*. The designs are neat in their way, and may perhaps be of interest to our readers on account of increasing their stock of patterns for work of this nature. None of the designs require lengthy description, because their features are readily determined from the cuts.

*Design of Roof Ornaments from a Recent German Catalogue.*

Gutter-plates in V-roofs also afford a grand opportunity to the cheap constructor to save timber; it is unnecessary to state that he does not hesitate to avail himself of it; consequently in a short time there is a permanent set; this is one of the causes of leaky roofs. Light rafters of long span are among the things to be avoided in construction. A really good, strong roof may be easily constructed by the introduction of a light truss, or by trussing two of the rafters, and placing the purlin upon the crutch formed at the junction of the strut with the rafter. By this means in small houses the span of the rafter is reduced to a minimum, and one of small scantling may be used with beneficial results. The construction of roofs by judicious trussing is a matter in which scientific knowledge will give the architect an immense advantage, enabling him to design a stronger structure with the same quantity of, and in many cases less, material. In the present mode of designing shop fronts the brest-summers are mostly formed of a balk of timber resting upon storey-posts of small scantling, and in many cases without any ties to the joints, to prevent the entire front from pitching into the street.

A large apartment-house building is to be erected on the corner of Seventh street and Porter avenue, Buffalo. The building will cost about $100,000. Messrs. Green & Wicks are the architects, and Mr. G. H. Lewis the owner. The carpenter-work has been let to Joseph Churchyard, and the masonry-work to Mr. Charles Berrick. The building will be five stories high.

## The Chimney-Shaft.

BY S. SMIRKE, R. A.

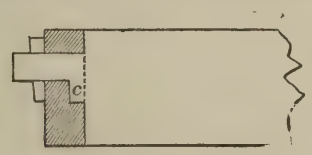
I must not forget to do justice to the chimney-shaft. Out of these trivial and uncleanly smoke-vents architects have taxed their ingenuity to produce really marvelous objects of high æsthetic value. Of classical interest they can scarcely be said to possess any, for it is very doubtful whether architects of classic times recognized the existence of such a feature. Vitruvius does not even name them. The remains of Herculaneum present not a single example of one; nor do the mosaics, frescoes, or bas-reliefs of antiquity show any indication of one, as far as I know. There is every reason to believe that the only means of escape for the smoke of their fires was through a hole in the roof, like the louvers of mediæval times, so that the "smoke nuisance" we complain of at the present day may lay claim to high antiquity. The very name of the large hall in a Roman's house, *atrium*, is believed to be derived from this nuisance. "*Atrum enim erat ex fumo.*" The statues in these halls are described by Juvenal and others as *fumosi;* and Vitruvius advises that there shall be no carved work in the interior of winter rooms, as they so soon, he says, get covered with soot. I apprehend that the roof timbers of our old baronial halls must have presented much of the same appearance; and as Horace complains of the "watery eyes" produced by the smoky halls, so our own mailed knights and their retainers could hardly have been better off. You will find that antiquaries are by no means satisfied as to the period of introduction of this great domestic convenience, the chimney, but it was somewhat late in mediæval times before chimneys became

very common. Viollet-le-Duc gives us in his "Dictionnaire Raisonné" a good example of one of the thirteenth century, formerly existing in the Abbey of St. Lô, and in England we have examples of still earlier date; but as civilization advanced, and men's domestic habits refined, the chimney became conspicuous. They lavished art upon the decoration of the hearths below, while the chimney above partook of the same feeling, and both gradually grew into favorite objects of design, until, in the sixteenth century, the exuberance of architecture—especially, I think, in France—led to the erection of those enormous and elaborate towers which we see provided for the discharge of smoke at Fontainebleau and very many other places.

## The Tusk Tenon.

BY ARTUS.

Few joints used in framing are more important than that known as "tusk and tenon," or, more properly, the "tusk tenon." The strength of a structure depends upon the efficiency of the joint to so great an extent, and the joint itself occurs so frequently, that too much care can scarcely be




*Tusk Tenon.—Fig. 1.—Method ... Very Common in New York.*

taken in its construction. Yet notwithstanding its importance it is quite the exception to find the joint properly constructed. Almost universally throughout the country, and certainly in New York and its vicinity, it is the custom to frame the joint in the manner shown in Fig. 1. The beams being 10 inches deep, the tenon is made 2 inches from the top and is itself 2 inches deep, leaving 6 inches beneath. The tenon is square at its shoulder and has the haunch or bearing *c*, as shown in the sketch. It is difficult to understand how so unworkmanlike a system can have obtained so firm a hold of our framers, and the more so as in many countries, notably England, this joint is constructed on more scientific principles, being almost invariably carried out as shown in Fig. 2.

The object in forming this joint is to give a perfect and stable bearing for the header while weakening the trimmer as little as possible. A beam weighted and supported as a trimmer is has the fibers at the bottom thrown into tension, and those at the top in compression—that is, at the bottom there is a tendency to pull them apart, and at the top to press them together. The compressive force from the top decreases in a

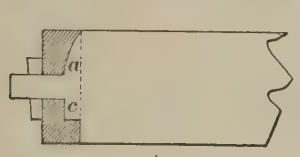
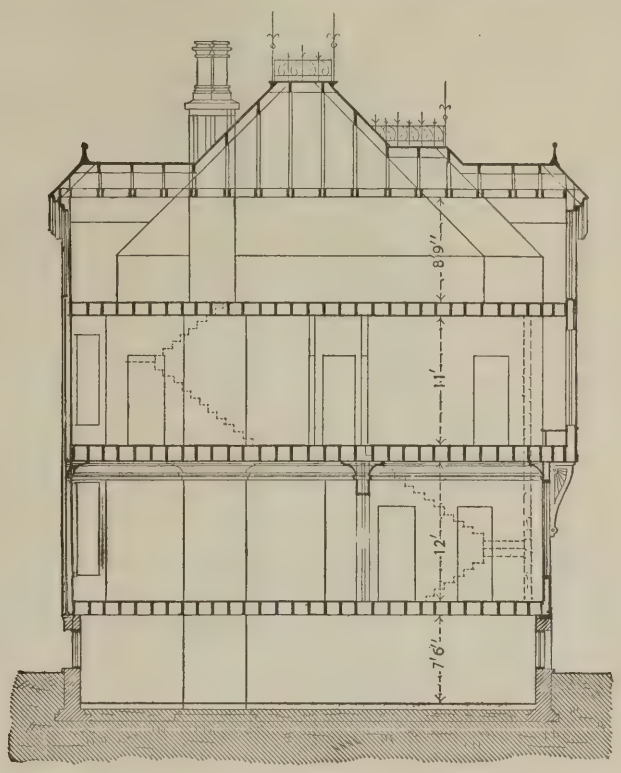



*Fig. 2.—Form of Framing used in Great Britain.*

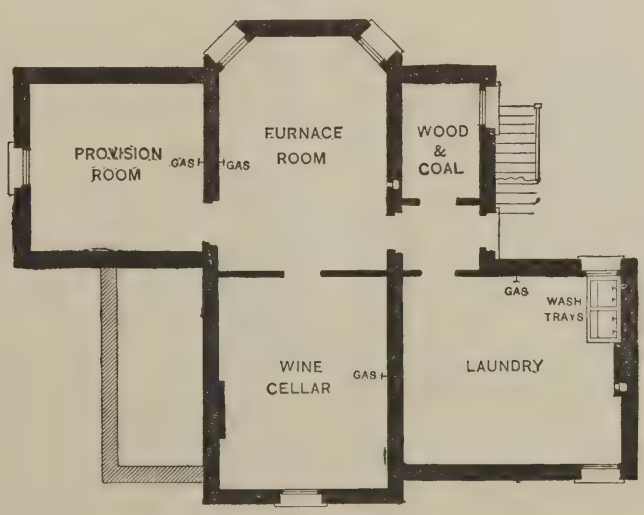
square ratio, going down the depth of the beam, and the tensile force decreases from the bottom upward, in each case toward the center, which is absolutely not strained at all, and is on that account called the "neutral axis." It is clear, then, that cutting out a portion of the beam as nearly as possible in the center of the depth of the beam will weaken it far less than if it is taken out at any other place, and it is on this account that the tusk in a tusk tenon should pierce through a point as nearly as possible at the center of the trimmer. Considering now the joint as regards the trimmer itself we shall find that the nearer the bottom of the beam the tenon is the less likely it is to split off, but, as it is imperative that we shall not weaken the trimmer to any extent, we come to the conclusion that the center of the beam is as low as it is advisable to be from the tusk. There is still some liability of the tenon splitting off, and it is on that account that the shoulder *a*, Fig. 2, is recommended, the bearing *c* being provided in each case. It will be seen now that the term "unworkmanlike," as applied to the joint at Fig. 1, was justifiable, for not only are both beams considerably weakened by forming the tenon high up, but there is no advantage as regards the tenon itself, even in the saving of time, an excuse which is so often pleaded in extenuation of bad workmanship.




*Vertical Section Through House Illustrated in Plates XLII to XLIV.—Scale, $\frac{1}{16}$ Inch to Foot.*

## Decay of Building Stones.

Building stones in general, says a writer in one of the British architectural journals, may be divided into two classes: 1. Those which consist of materials not easily acted upon by acids. 2. Those composed of materials which are partially or entirely acted upon by acids with facility. As an illustration of the first class granite, porphyries and serpentines may be quoted, while to the second belong limestones, dolomites and certain sandstones containing carbonate of lime as cementing material. Regarded from a purely chemical point of view, the difference in the resisting power to corrosive agents of different stones would appear at first sight to depend entirely upon their chemical composition, but even a moderate acquaintance with the properties of the components of such building stones demonstrates that there are other conditions at least equally instrumental in determining the degree of permanence of different stones. It is a well-established fact that the same chemical substance exhibits in different conditions a great variation of its behavior with chemical agents. Numerous examples might be quoted in illustration of this. Thus, marble and chalk are chemically identical, but owing to the difference in their physical structure—the one being crystalline and the other amorphous—the former is much less readily acted upon by acids than the latter. Again, artificial peroxide of iron is readily soluble in acids, peroxide of iron in the form of hematite is attacked with difficulty by acids, and the same oxide after exposure to a pow-




*Foundation Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.*

erful heat is almost entirely insoluble in acids. The influence of aggregation in these instances, and in numerous others which might be quoted, is obvious and generally admitted by chemists, however different and imperfect may be their views regarding the connection between physical condition and chemical effect. The observations just made regarding the behavior of substances such as enter into the composition of building stones cannot but apply with equal force to the aggregates of such components to the building stones themselves. The atmospheric influences to which building stones are subject are many of them essentially chemical actions, involving processes analogous to or identical with those performed in the laboratory; although from the extreme dilution of the chemical agents, as existing in the atmosphere, they must necessarily be of a very gradual character. There are few instances in which the influence of the state of aggregation upon the permanence of a building stone is more apparent than in that of the dolomitic limestone used in the construction of the new Houses of Parliament. Here, in one and the same block of stone of comparatively small dimensions, we find certain portions of the surface powerfully disintegrated, while others appear in a perfectly sound condition. Chemical analysis has hitherto failed to establish any important difference in the composition of sound portions of such stones and those parts which are subject to decay; it is therefore legitimate to attribute the unequal permanence of the stone, under atmospheric influences, to such structural differences as may be comprehended under the term "state of aggregation."

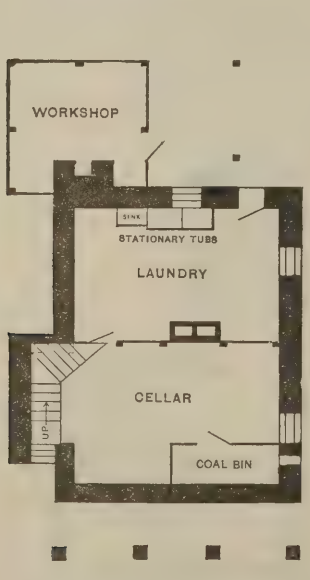
## Strength of Wooden Beams.

In writing upon this subject C. G. Smith says: Galileo was the first to investigate the strength of wooden beams on purely mathematical principles, and, like many later investigators, after employing the higher mathematics to an unlimited extent, arrived at conclusions incompatible with practice. To use Tredgold's words: "Fortunately that precision so essential to the philosopher is not absolutely necessary to the architect and engineer." Consequently simple formulæ, such as $W = C\frac{ba^2}{L}$, may be resorted to in practice. These formulæ are generally deduced from actual experiment in the manner somewhat as follows: If a beam of $b$ inches in breadth, $d$ inches in depth and $L$ feet clear span breaks with a weight, $W$, in hundredweights applied at the center, it is not difficult to determine in what ratio the strength of another beam of the same material will vary. If the breath be double, it is at once evident that its strength is doubled; if its length be double its strength is practically halved, and if its depth be double its strength will be increased four times. For these reasons the sectional areas in tension and compression as well as the distance apart of their centers of gravity are doubled; consequently the moment of resistance of the beam is increased four times, and similarly by using any other depth it will be found that this moment varies as the square of the depth. The breaking weight therefore varies directly as the breadth and square of the depth, and inversely as the length; therefore $W \propto \frac{b\,d^2}{L}$. Now, it is well known that the adhesion of the particles or fibers to one another affect the strength of a beam to an extent that can only be determined by introducing an unknown quantity. $W$ therefore becomes equal to $C\frac{b\,d^2}{L}$, where $C$ is the unknown but nearly constant quantity, the value of which can only be obtained by actual experiment. But, since the strengths of no two beams of the same timber and scantling are precisely the same, it follows that no two constants will be equal in value. This accounts to some extent for the variety of scantlings employed for one and the same purpose. A short time since a warehouse floor gave way, and the engineers employed on opposite sides of the law action which ensued had little difficulty, by using the extremes of constants, in making their calculation suit the wishes of their respective clients. The floor was thus shown on good authority to be at the same time both amply strong and too weak. Under these circumstances the only course to pursue was to call in an independent witness, who, not being content to accept a constant which might at any time be disputed, had a beam from the floor in question tested, deducted a constant from the result, and gave his evidence accordingly. As the quality of timber varies very considerably, even in the same cargo, before employing it in work of any magnitude one or more average samples should be tested and a constant deducted on which all calculations for the strength of the timber may be based.

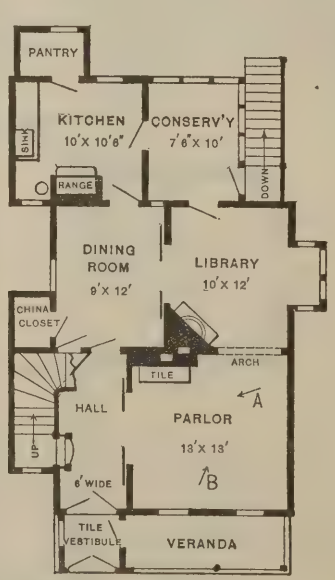
*Design for Vestibule Tiling.*

## Mosaic Vestibule Tiling.

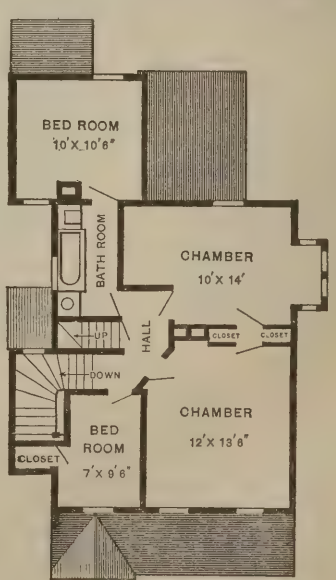
We present herewith a design for vestibule tiling that illustrates in a very happy manner a style of work that is very extensively employed in the cities at the present time. Different patterns of tile are employed in forming the outside margin and also the border of the panel. The central figure is likewise made of tile, or it may be worked of cement. The body of the panel is formed by broken pieces of tile bound together by cement. The designer is R. Fischinger, No. 103 East 103d street, New York.




Foundation.




First Floor.




Second Floor.

*Floor Plans of House Illustrated in Plate XLI.—Scale, $\frac{1}{16}$ Inch to the Foot.*

PLATE XLI.

RESIDENCE OF MR. W. REID. WEST HOBOKEN, N. J.

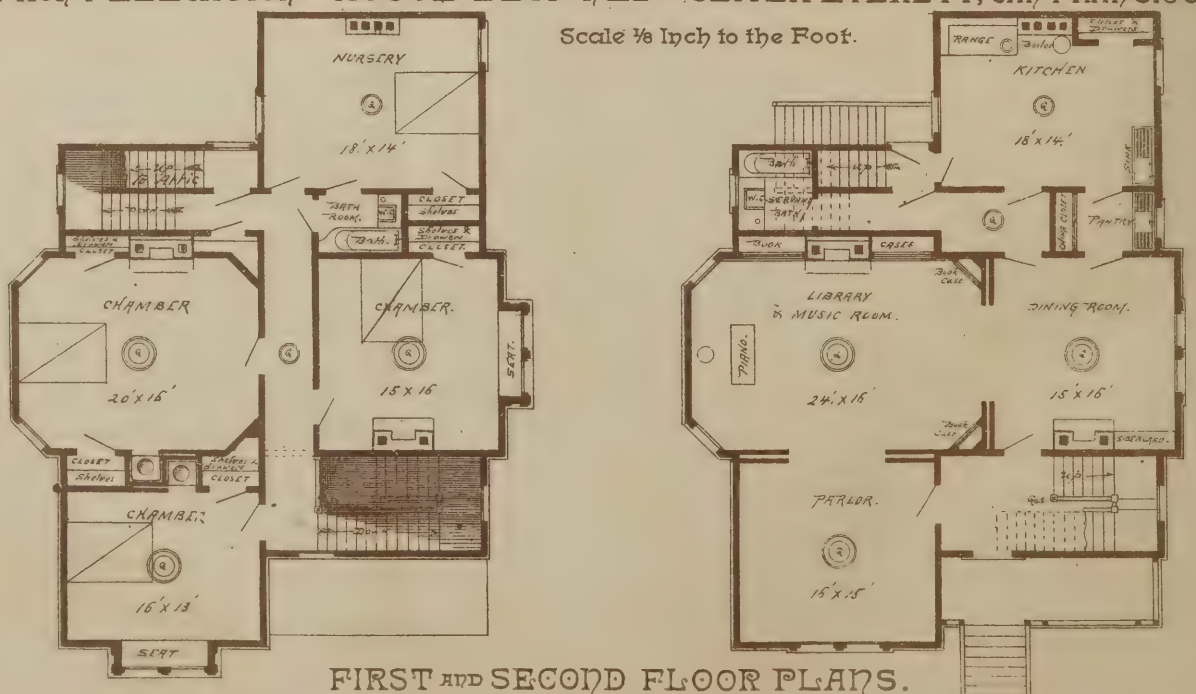
VIEW IN LIBRARY.

VIEW IN FRONT HALL.

PLATE XLII.

FRONT ELEVATION OF HOUSE DESIGNED BY OLIVER EVERETT, SAN FRANCISCO.

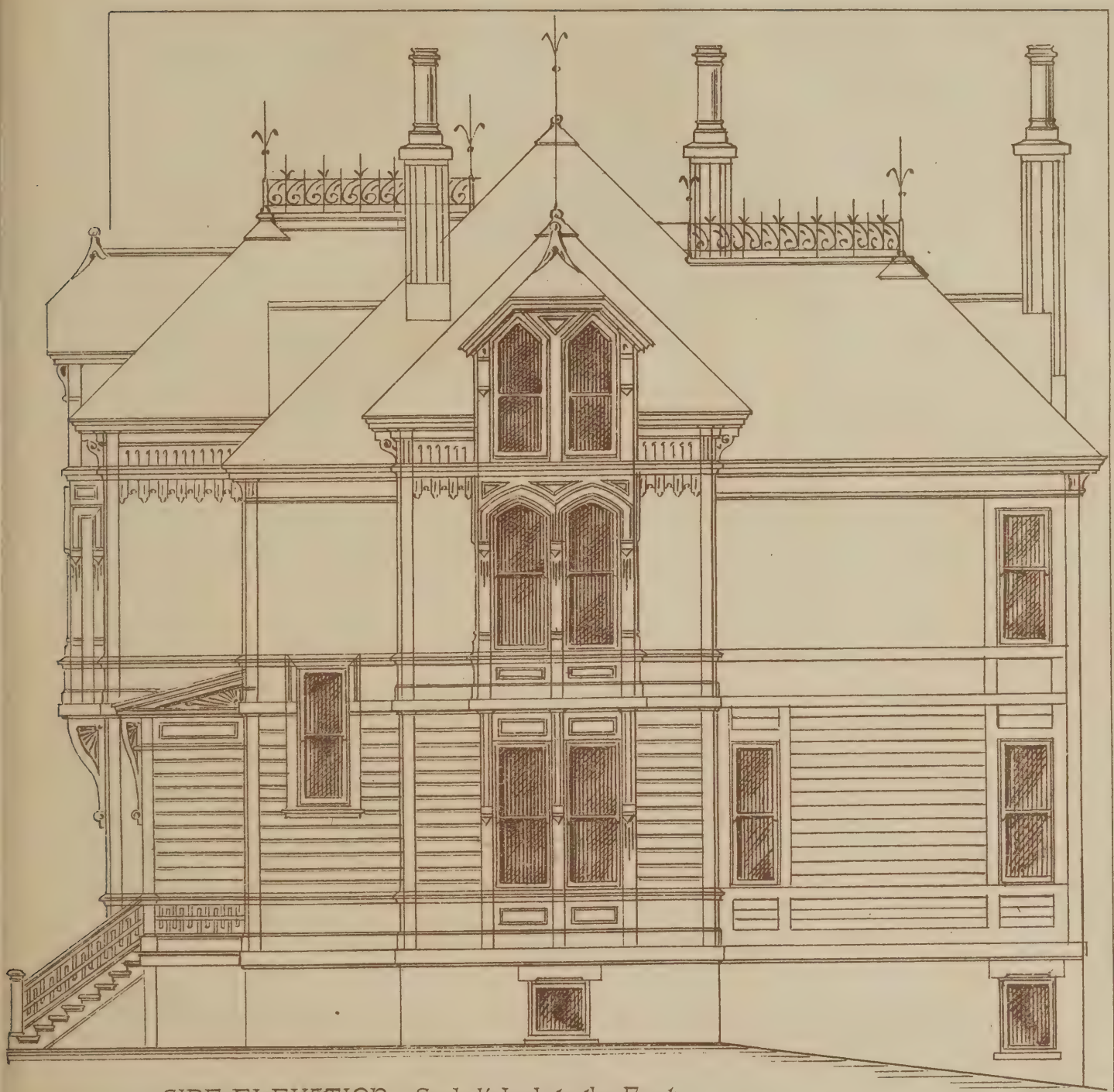
Scale ⅛ Inch to the Foot.



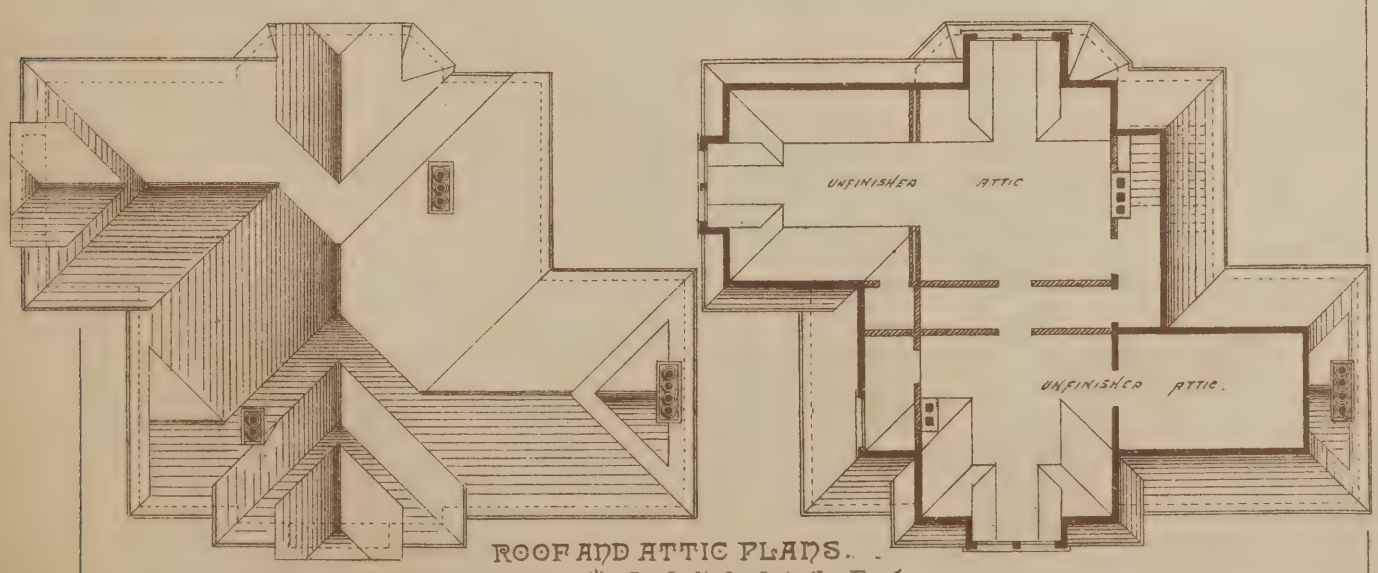

FIRST AND SECOND FLOOR PLANS.

Scale ⅛ Inch to the Foot.

PLATE XLIII.



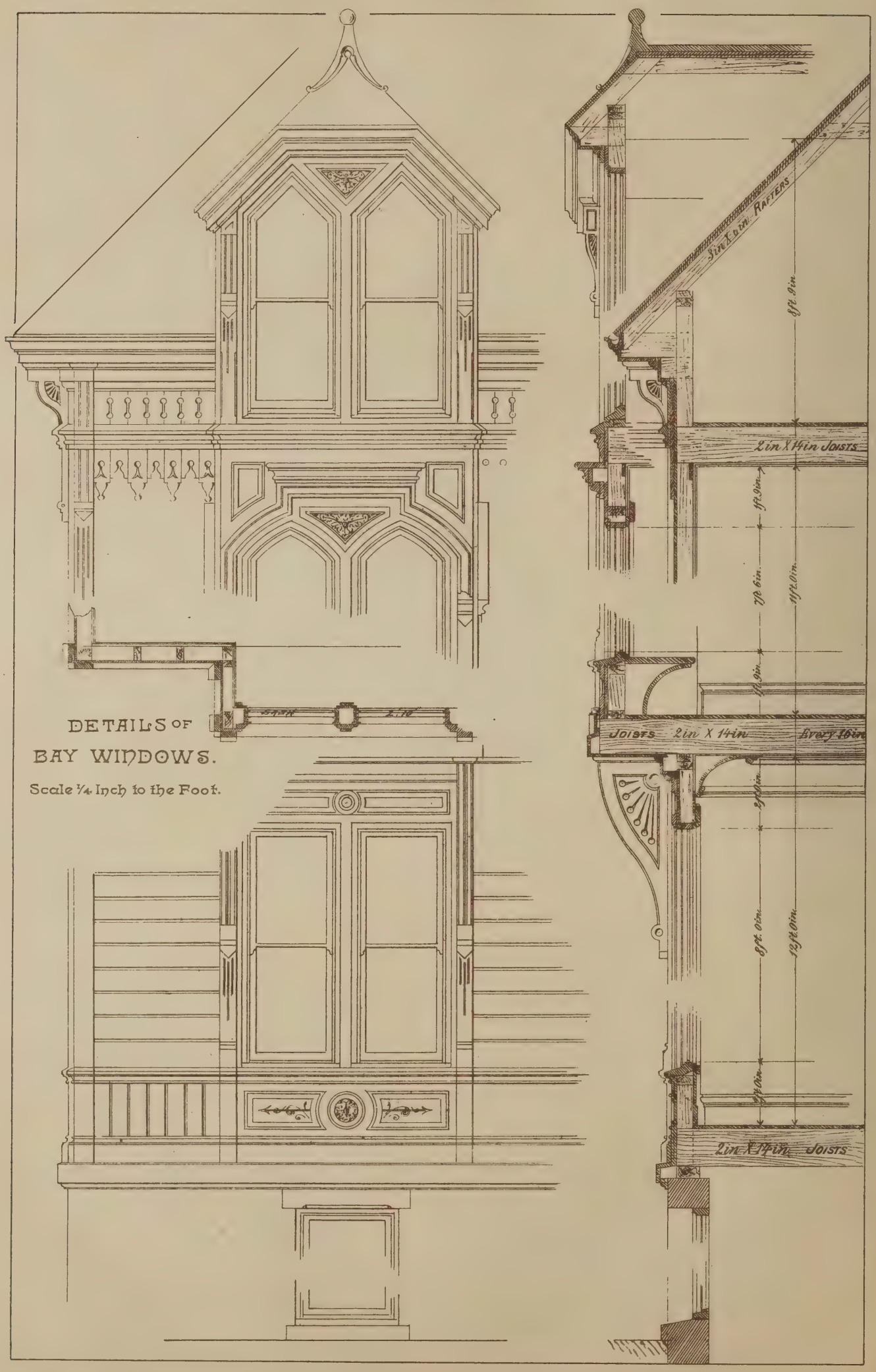
SIDE ELEVATION.—Scale ⅛ Inch to the Foot.




ROOF AND ATTIC PLANS.

Scale ⅛ Inch to the Foot.

PLATE XLIV.




DETAILS OF BAY WINDOWS.

Scale ¼ Inch to the Foot.

# CORRESPONDENCE.

### An Appreciative Subscriber.

*From* M. A. MARSHALL, *San Diego, Cal.*—Dear *Carpentry and Building*, it is by some endearing name that I must address you. I have been a close reader of the paper since its commencement, and every month during that time I have found something new and valuable in it. After serving an apprenticeship in England, where it is supposed that a man has learned all that can be learned during that time of rigid training peculiar to the English, and having added to that a very extensive experience in various States in the Union covering a period of 30 years, I still find in *Carpentry and Building* valuable instruction for the old veteran as well as for the young beginner. I have managed quite extensive shops, and have one at present in operation. *Carpentry and Building* can always be found in my office, and serves as a ready reference for lines, cuts, &c., besides furnishing many valuable and varied designs that are of more value month by month than the yearly cost of the paper. I unhesitatingly recommend it to all carpenters who wish to keep up to these times of ever-changing designs in all matters relating to our trade.

I inclose you a photograph of a mantel manufactured in my shop from California curly redwood. The main features of the mantel are taken from *Carpentry and Building*. The over-mantel, however, is original.

The mantel in question is at present in the parlors of Mr. Wm. Parish, of this city.

*Note.*—We get a great many very flattering and quite appreciative letters, but it is comparatively seldom that we publish any of them. This communication, however, coming from an experienced man in the trade, seems to deserve more than passing attention, and, further, it incloses a photograph which we have thought worthy of reproduction in the interest of our readers. The cut on page 203 has been made from the picture inclosed by our correspondent. California redwood is something not very well known throughout a very considerable portion of the Union. Its merits as a building material, however, are becoming more and more appreciated. It is used for cabinet-work and interior finish, and also has a market in the form of finer shingles for roofs and outside finish. The variety which our correspondent has used for the mantel, the design of which he furnishes, is the "curly," which develops a very pretty and attractive pattern under polishing treatment.

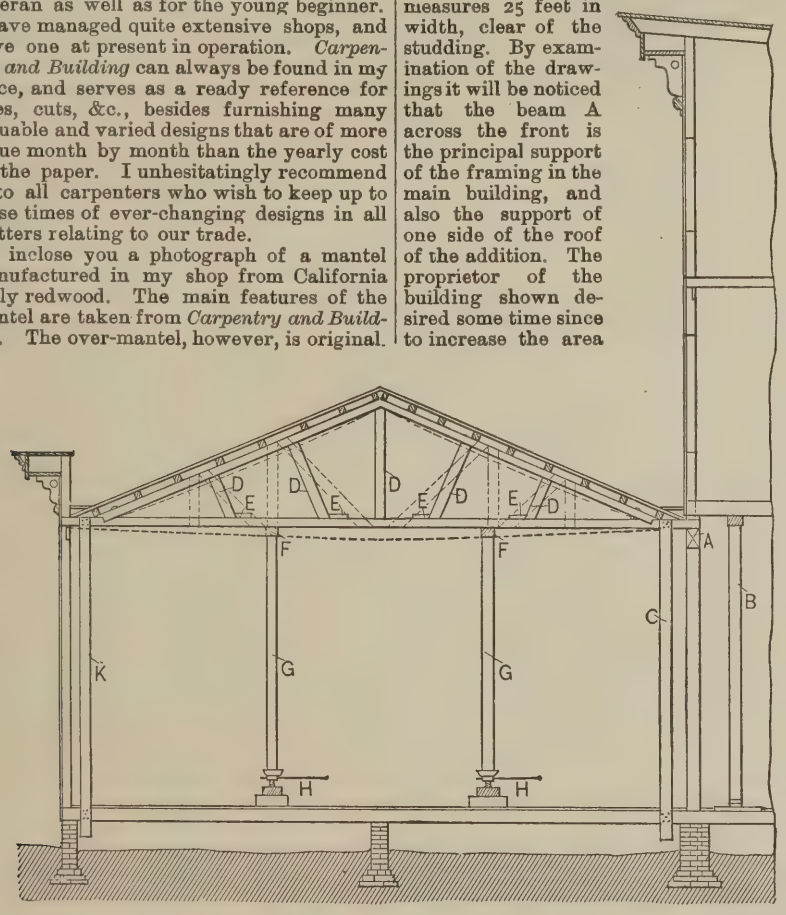
### Notched Steel Square.

*From* G. H., *Chelsea, Mass.*—I would like to learn through *Carpentry and Building* where I can obtain a carpenter's steel square that has the inside of the tongue notched every ¼ inch for receiving a pencil for marking parallel lines for laying off mortises, &c.

*Note.*—We have never seen such a tool to our recollection, and do not know that anything of the kind is being manufactured. If any of our readers have information concerning such an article we shall be glad to hear from them.

### Solution of a Roof Problem.

*From* O. B. M., *New York City.*—It frequently occurs in practical work, owing to carelessness upon the part of the original constructor, or else on account of the materials employed or a lack of sufficient material, that difficulties are met with in changes and repairs that are somewhat hard to overcome. The accompanying drawing shows in section a building consisting of two parts, the main house having a flat roof and a one-story addition which measures 25 feet in width, clear of the studding. By examination of the drawings it will be noticed that the beam A across the front is the principal support of the framing in the main building, and also the support of one side of the roof of the addition. The proprietor of the building shown desired some time since to increase the area of the storeroom, and to do this it was determined to remove the studding under the cross-beam A and substitute turned columns, placed 10 feet apart. To do this alone would have been comparatively an easy matter, but upon stripping the walls the beam A was found to be badly rotted, caused in part by a leak in the gutter of the front building. Accordingly it was necessary to remove it and put in a new beam. For this purpose two rows of shores were employed, one placed as shown at B and the other on the opposite side about the same distance away, to carry the two sections until the old beam could be taken out and replaced by a sound stick of yellow pine. While this work was in progress it was noticed that the ceiling of the addition was depressed so as to sag very considerably in the center of the building. The work was examined with a view of determining whether the bowing could be corrected without the necessity of stripping the roof, and the most direct means of accomplishing it. Examination showed that the sagging of the ceiling was due in part to the weight of a yellow-pine ceiling which had been put below the tie-beams of the roof. The line of the ceiling as it was deflected is shown in the sketch by the dotted lines across the building, and similar dotted lines show how the rafters were also deflected. The following method was adopted: The whole roof was raised in parts of three trusses at a time. To temporarily sustain each piece struts D D D were inserted between the rafters and the tie-beam. These were prevented from slipping by the foot-blocks E E. The tie-beam was in turn carried on longitudinal s retchers, F F, and these were borne on the ends of posts, G G, resting on screw jacks, H H. To provide against the bearing ends of the tie-beam rising with the center while pressure was being exerted by the jacks two ties, as shown by C and K, were firmly spiked to the ends and also to the floor beams below. These precautions taken, the roof framing was forced back into place by means of the screws. The result was highly satisfactory, and the depressed trusses were straightened without straining or injuring the material. After this had been accomplished ties and trusses were nailed in position as indicated by the dotted lines across the truss. This work was completed some six months since, and the roof has retained its camber, and so far shows no signs of yielding.




*Solution of a Roof Problem.—Sketch Accompanying Letter from O. B. M., New York.*

### Why Pumps Lift Water.

*From* P. A., *Oil City, Pa.*—I am a plumber, and would like to have you tell me why a pump cannot lift water more than 32 feet. The question has often been asked me, but I cannot give a satisfactory answer. I should be obliged to you if you could answer the question through the columns of *Carpentry and Building*. There are five plumbers at work in the shop with me, and not one of them can tell the reason why a pump can only lift water 32 feet. We all profess to be first-class workmen, but I think we are not when we cannot answer such a question as that because we do not know the reason. I think in giving a little light on this subject you would be doing many of us poor workmen a great favor.

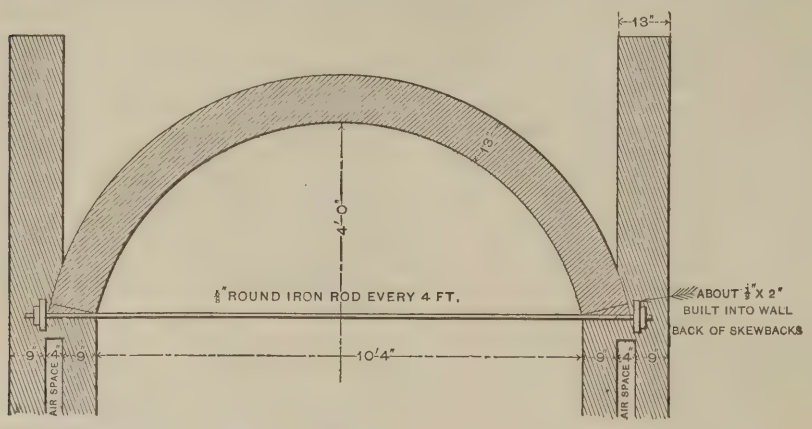
*Answer.*—To put the answer in the shortest and plainest form possible, we may say that the pump lifts water only 32 feet because the "head" of air resting on the water outside is just equal to a 32 foot "head" of water. If we should go down under water, say, 64 feet, and at that depth put a pump into a tank of quicksilver or mercury, we should find that the mercury would rise about 37 inches. Now, if we take a couple of tubes and put pressure gauges on the bottom, and fill one with mercury, so as to have a head of 57 inches above the gauge, and fill the other with water, 64 feet head, we shall find that both gauges will mark the same figure—about 25 pounds per square inch. If we had set up our mercury pump still lower down, the pressure would have been greater and the pump have lifted further. Now, at the level of the sea we are at the bottom of an ocean of air; just how deep it is we do not know, but the head is equal to about 14 pounds per square inch, or the weight per square inch of a 32-foot column of water. Now, if we can take off the pressure from one end of a tube by means of a pump and valves and put the other end in the water, it is evident that the air will push the water up the tube until the back pressure of the water, or the weight of the water in the tube, is equal to the down pressure of the air. If we should take a pump down into one of the deepest mines we should find that the water would rise something more than 32 feet, simply because of the increase in the head or weight of the air above it. On the other hand, on the tops of high hills, or in the mountains, pumps lift a much shorter distance, because there is less pressure by the air upon the surface of the water. At the level of the sea the theoretical limit is 33.95 feet. In answering our correspondent's question we have used his figures, which are presumably correct for his locality.

When people talk about "suction," and seem to think that the pump itself has something to do with forcing the water to rise, they are evidently laboring under a mistaken notion of how water is raised by the so-called "suction" or lift pump. The plunger removes the air from the pump tube, and, as the air outside is pressing equally everywhere, the water is forced

into the empty space. When we have trouble in getting a pump to "draw," and have to "prime" it with water, it shows that the valves and plunger are not tight enough to exhaust the air in the pump barrel.

### Trouble with an Arch.

Some months since we received from a correspondent the following letter of inquiry, accompanied by a sketch of an arch, which it seems had given way and resulted in loss of life:




*Trouble with an Arch.—Diagram Accompanying Letter from J. A. G.*

"*From* J. A. G., *Mattoon, Ill.*—I am very much interested in the stable or unstable character of the brick arch shown in the sketch inclosed. A lawsuit is pending. The character of the work is admitted to be good, but is the design right for a vault 30 feet long and 10 feet 4 inches wide? The side walls are continued up to the floor of the next story, as shown. There is some filling done on the haunches, but just how much I cannot say. Please give me your criticism of the design."

To this we prepared an answer, but after it was in type we received a request from our correspondent that we hold the matter back for the time being, since its publication would necessarily have an influence upon the trial that was then pending. We now present the answer, and follow with some particulars:

"*Answer.*—The accompanying engraving has been made from the sketch inclosed in our correspondent's letter. The design shown is not good for a vault 30 feet long and 10 feet 4 inches wide. The strains depend upon the hight of the side walls, whether there is to be any support or pressure against them, and the uses to which the side walls above the arch are to be put. Speaking in the most general terms, the design of the side walls is not good because they are greatly weakened by the air spaces. The solid wall under the arch should be at least the thickness of the arch. Two walls not bonded and separated by an air space are much like bricks stood up in a row. The second brick does not prevent the first from falling when it has been started. The side wall as carried above the arch is not well connected with the arch. Any filling on the arch tends to force out the outer wall that should aid in supporting the arch. The tie-rods should have gone through the entire structure and should have been supplied with larger plates. It is faulty construction to tie an arch together in the manner shown. It is a question indeed if tie-rods should ever be used in masonry construction, certainly not unless they are imbedded in the material of which the structure is composed. The strains of the arch are downward and horizontal—pressures that together form an oblique pressure, as in a strut. The side walls as given in the sketch are manifestly unable to carry this strain. For this reason the tie-rods were probably put in. If the tie-rods hold, the entire pressure becomes a downward one which the side walls can carry. It is fair to presume that such a structure would show weakness. If it shows no weakness, the credit is due to good workmanship—not to the character of the design. Although we do not know the purpose for which this structure is to be used, it would seem to us that if iron beams had been placed across the vault and built into the side walls, the distance being from 6 feet to 10 feet, according to the load to be carried, and had been filled in between with brick arches, a better structure would have been the result, with the additional advantage of an increase of room, and that, too, without an increase of cost. The haunches of the small arches in the case could be filled in and thereby make a floor for the room above."

Concerning this case we are informed that the first plans of the building in question, which was a courthouse, required I-beams and brick arches between for the roof of the vaults. The county had voted $20,000 to build the courthouse. All the bids submitted ran above that figure. The Building Board proposed and finally did cut down the plans so as to bring the cost of the building within $20,000. Among other things, according to our information, they changed the covering of the vault to a longitudinal semicircular brick arch, and the side walls to be some 6 feet high to the springing line. All the first-floor windows were some 11 feet in hight. The vault window must necessarily come to the floor. To obviate this the local superintendent, by order of the board, gave the contractors in writing an order changing the springing line to a position somewhat higher. The number of feet was left blank in this order. To fill the blank the superintendent himself marked with his own hand, as our informant states, on an end wall already built, the point. This required the arch cover to be depressed below the full half-circle. The specification required a ½ x 2-inch iron built in the side walls at the springing line, with ¾-inch tie-rods every 6 feet. The contractors put the tie-rods every 4 feet. The foreman of the carpenters built a wood center for the vault about 16 feet long, or half the length of the vault, and put it in place on the side walls. The ends of the covering boards of this center, it is said, rested 3 or 4 inches on the brick wall at the closed end of the vault, and in turning the arch these ends were built in the wall. The arch having been built in half of the vault the foreman proceeded to remove the center to the other half of the vault, but in attempting to get it out the work fell, killing the foreman. His wife, as administratrix, brought suit for $5000. After the usual tedious delays incident to trials nowadays the case was decided, and damages, although in a much less amount than above named, were assessed against the contractors. The whole question is of considerable interest, and we might go into much more details concerning the matter than is here presented. We give these general facts, however, in explanation of the circumstances which caused us to withhold matter which had been prepared for publication.

### Cypress Wood.

*From* S. O. E., *Evergreen, La.*—In answer to "G. J.," of Coopersburg, Pa., I would say that I have had 15 years' experience in working cypress, and find that its qualities are various. We have here three varieties—red, yellow and white. The red is the most desirable. When green it will sink in water. The yellow comes next in quality, while the white is the poorest of the three. The red cypress is the most desirable wood we have here for posts, clapboards and for all parts of houses that are exposed to the weather. For fence posts its durability is from 12 to 15 years. All the varieties of cypress take water easily and swell as badly as linn or basswood. Some pieces will shrink in length to the extent of ½ inch in 10 inches. Others will not shrink at all. We use cypress for floors in stoops, galleries, and in other exposed places. It is too soft for inside floors. It splinters and becomes rough in use. Cypress is stronger than hemlock for framing, and it is uniformly free from wind shakes and nearly free from loose knots. The great fault in framing, however, is that it springs badly in sawing. For instance, if four sills 8 x 8 inches in section, 2 feet long, are sawn out of a log, each will have 6 inches crook when it leaves the saw. The timber springs toward the sap.

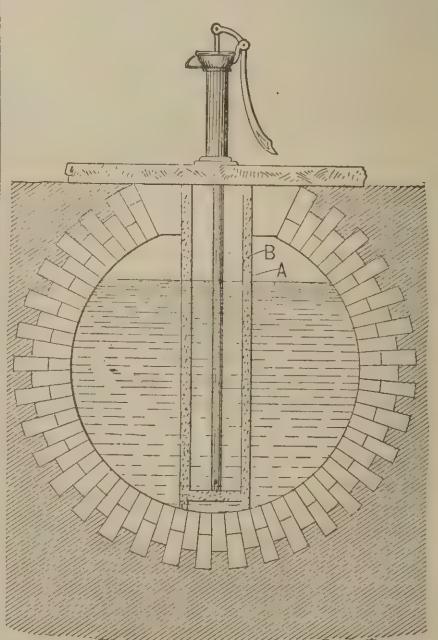
### Setting Plate Glass.

*From* "J. B. A." *Algano, Iowa.*—I would like some information with reference to setting plate glass in store fronts. What is the best method of glazing, and what provision should be made for giving the glass room for contraction and expansion? Is rubber packing advisable?

*Answer*—Plate glass as ordinarily put in place is very simply managed. The glass is put in position and held in place with a bead or molding, after which it is puttied up in the usual way. The most common provision for contraction and expansion is placing a pine chip under the glass. This is necessary only where the sash or frame is of hardwood. Rubber packing no doubt would answer, but the chip serves every purpose and is always at hand and costs nothing.

### Cistern Filters.

*From* J. R. P. *Mechanicsburg, Ohio.*—We have given the matter of filtering rain water, as drawn from the cistern, some attention, and the result of our experiments is shown in the accompanying sketch. In many instances it is not convenient to build a hollow pillar in a cistern. The plan shown works well, and very satisfactory results are obtained with moderate cost. Referring to the sketch, A represents a casing of metal perforated; B represents an inner casing. The space between the two casings, 2½ inches in extent, is filled



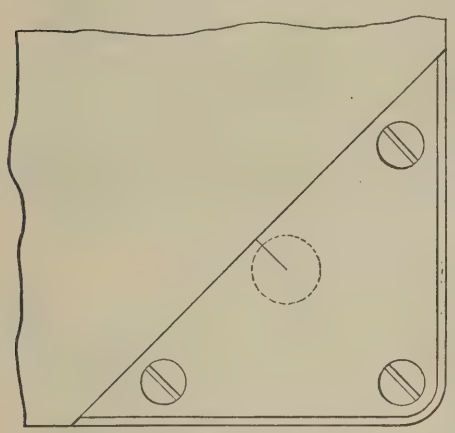

*Cistern Filter Recommended by J. R. P.*

with charcoal or other filtering material. The outside diameter of the filter 14 inches. The pump is placed in the filtering tube, and accordingly all water pumped from the cistern necessarily passes through the charcoal or other filtering material, resulting in pure water. Whenever desired the filtering tube can be raised from the cistern, refilled and put back.

### Substitute for Drafting Tacks.

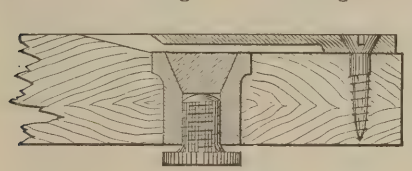
*From* F. T., *Chattanooga, Tenn.*—Do you know of any satisfactory substitutes for pins for holding paper to drawing boards?

*Answer.*—Not a few of our readers, we dare say, have often mentally, if not actively, protested against the barbarous plan in vogue of fastening drawing paper to drawing boards. The idea of driving a nail through



*Substitute for Drafting Tacks.—Top View.*

it, even though the nail may be modified in form for the purpose, is certainly barbarous, and it has long been our wonder that a better plan was not suggested. We do not know of any good substitute available at the present time. In recent files of our English exchanges we find an article intended to meet the demand that unquestionably exists for something of this kind. Believing that our readers will be interested in it, we have reproduced the engravings, and present them herewith in connection with the description. The drawing-paper clip illustrated is the result of several attempts in the general way of invention made by different draftsmen. In its present form it is credited to Mr. James P. Maginnis, of No. 9 Carteret street, Queen Anne's Gate, Westminster, S. W. London. The clip consists of a metal plate which is screwed to the angle of a drawing-board,



*Sectional View.*

which is cut away in such a manner that the general surface of the board is flush with that of the clip. This is illustrated in the sectional view. The clip when thus attached to the board provides sufficient space under its thinner portion to admit of the insertion of the thickest drawing paper. Underneath the clip is a metal socket, on which rests a circular tapered metal plug. The upper surface of this plug is flush with that of the socket when the paper is inserted beneath the clip. As soon as the clip is in position the screw on the lower side is turned, forcing the plug gradually upward until it grips the paper tightly. The paper is thus held by the pressure of a metal surface ⅜ inch in diameter, which does not make a hole in it or tear it like a pin or drafting tack. The surface of the clip being flush with that of the board, no obstacle is met by a T-square or other drawing implement which may be employed above it. We understand that in England this device is furnished either in brass or nickel-plate, and that it is meeting with much favor.

### Ownership of Plans.

*From* S. B. B., *Appleton, Wis.*—In a recent number of *Carpentry and Building* "G. F. R." says, in regard to the ownership of plans, that in his opinion they are the sole property of the architect. I would like to ask of this correspondent what is his opinion in the following case: I say to the architect, "What will you charge me for plans for such and such a building? I do not want you to superintend it, and only want the drawings." I desire to ask "G. F. R." if under these conditions the architect does not sell his plans. He names a price, and I put my builder to work with the plans I have bought. Again, "G. F. R." says, "I think the architect's fees cover the making of all necessary drawings for the proper performance of the work." With reference to this I desire to inquire if it does not depend in a great measure on the contractor or builder as to what drawings are necessary. Some contractors need double—yes, three times—the plans that others require. In that case should the architect have increased pay? In many instances architects do not know when they make their plans who is to execute the work. Perhaps some cheap John gets the job, and then the plans which the architect has furnished have to be increased almost to the extent of showing where nails should be driven. Half of the architect's time is employed in teaching cheap John how to do his work. Your correspondent asks, "In case the builder, in the absence of figures, follows the plans as nearly as he can scale them, and the work is wrong, whose fault is it?" I think specifications usually call for the builder to use figures on the plans instead of measurements. If by mistake the architect has neglected to mark the dimensions and distances (and such mistakes will happen), and the builder is in doubt as to what is his duty, he should call the architect's attention to the same. All persons are liable to make mistakes, but if the necessary plans are furnished by a competent architect and put into the hands of a competent builder very few mistakes will occur. I do not think because A is an architect that he "knows it all." B is a builder, but does not claim to be an architect. Still, could it not happen that B has some good ideas in regard to style of finish, dimensions, &c., as well as A? B is a practical workman of many years' experience; A never had a jack-plane in his hands, but for years past has studied more or less. Under the circumstances is A's judgment superior to that of B in all cases? I think good practical builders are always able to suggest new and good ideas to architects. I am disposed to place competent builders and architects on a common footing. One cannot get along without the other. The architect may handle a pencil better than the builder, but, on the other hand, the builder can handle a jack-plane and square better than the architect. Combine the two and secure the ideas of both; do away with the "cheap John" clap-trap, and the result will be very few mistakes to be paid for by the owner or builder and greatly improved buildings.

*From* "U D.," *Harrisburg, Pa.*—I have read the several articles on the ownership of plans, published in the past in *Carpentry and Building*. I am greatly pleased with the common-sense view of the subject held by the Editor and also your correspondent "G. F. R." Please let me express my views as an architect: There is no doubt that the plans are the property of the architect, for reasons shown in the communication referred to, and that he should own them for the protection of his clients. Almost every one in the building business can remember cases where a man a little ahead of his neighbors has employed an architect to make the plans for his building. A new style of building is the result. The brackets, balusters, &c., are of a form that is new in that section of the country; the plans remain with the builder; the planing mill retains the patterns, and in a short time the brackets and balusters are in use on other buildings in the neighborhood, causing the first building to lose its distinctive character. The rights of the public demand that the architect should own the plans, so that it may be known at whose door to lay the sameness in store and street fronts. Let some enterprising merchant procure plans for a new store front; he employs an architect and his front is well proportioned and made to suit the hight of the building. Praises of the improvement will be heard on every side: "How fine it is," &c. The plans, however, are left with the builder and planing-mill man. They are reported to the owner as being lost. In a very short time there will be the same style of front seen, brackets, moldings and all, on all sorts of buildings, whether the details be appropriate to their construction or not. They will be used on three-story buildings and on one-story buildings. In any town or city having 10,000 inhabitants and upward many illustrations of this kind may be found. The result is to make the buildings look as though they were built by only one man, and that he had only one idea or could do work in only one style. The result is that the town or city, as the case may be, displays a seeming lack of taste or mechanical skill. All this would be changed had each one in building secured different plans.

Now, a word or two about the number of plans and details to be furnished. Some architects are just as foolish as some contractors. They will take a job of work for the sake of having it, and, of course, under the circumstances, do not get enough for it to warrant making all the details. Again, some are so penurious that they will buy only the front elevation, floor plans and specification, leaving the builder to take all the responsibility for details. So long as builders can be found who will take a contract with so meager a description of the work to be done, just so long will there be trouble. Every contractor and builder should have it stated in the agreement what description of work will be furnished by the architect. Architects look upon their plans very much in the same way as a lawyer looks upon his memorandum of law points in a case before the court, or as a doctor on his prescription. No person questions the ownership in these cases.

I would like to hear from those who think the plans do not belong to the party who made them, with reference to whom they do belong. Let them tell also who wants them and what for. They certainly do not belong to the builder, because he cannot show any legal or moral claim to them. He does not pay for them, and if he retains them they can be recovered from him. There are very few instances in which the owner will attempt to claim them. He will very naturally say: "I have the building to look at, and, accordingly, I have no further use for the picture or drawings." I do not wish to be understood as saying that all builders wish to retain the plans and make use of them as above described, for I know that there are many honorable men following the business.

### A Circle of Silver Dollars.

*From* W. R., *Holton, Kan.*—The question came up, How far will one million silver dollars reach placed side by side with edges touching? This problem was worked out, and it was found they would reach 23 miles 3560 feet. I then put a puzzler by asking how large a circle the one million dollars would make by taking the measurement through the dollars at the points they touch. Will you kindly give a solution of this problem in *Carpentry and Building*?

*Answer.*—The manipulation of dollars, silver, paper or of any other material, is something that editors are proverbially ignorant of. Without confessing to a more itching palm than others of our calling, we nevertheless wish that our correspondent had sent us a few bushels of buzzard dollars to play with, for it would have pleased us beyond measure to have made a practical test of the circumscribing efficiency of such articles. We hope our correspondent fully understands that mathematics, with all its

boasted accuracy, is a very deceptive science, and that figures carelessly used often give very curious results. We doubt, however, if any arguments we can present will persuade our correspondent to permit us to experiment practically at his expense, so we must employ mathematics out of sheer necessity, but owing to the lack of certain tables we can do no more than indicate the way in which the problem can be solved. A circle whose circumference is 23 miles 3560 feet would be 7 miles 2828 74 feet in diameter, which is found by dividing the circumference by 3.141592. The circle which would be formed by 1,000,000 silver dollars placed together and measured through their points of contact would be a little smaller in size. To determine the diameter of such a circle it is necessary to make use of trigonometry as well as a set of very full logarithmic tables. If our correspondent is familiar with trigonometry and will make a diagram of a circle surrounded by other small circles representing silver dollars he will readily perceive that the radius of the circle required will be the base of a right-angle triangle whose perpendicular side is 0.75 inch and whose adjacent angle is 89° 59′ 59.352″ From these data the formula for finding the radius of the large circle will be log. radius = log. 0.75 + log. tan. 89° 59′ 59.352″. Finding the radius from this formula and multiplying it by 2 will give the diameter of the circle required. The ordinary tables of trigonometrical functions are, however, altogether too crude for any such delicate work, and without a table such as is necessary for astronomical calculations it is impossible to arrive at even an approximate answer. As we have no tables of this kind at our command we cannot answer our correspondent's inquiry any further than we have done.

### Warming a Church.

*From* T. E., *Flushing, L. I.*—Inclosed you will find a rough sketch of a stone church, showing ground plan and section. I want to get your idea of the easiest and most economical way of heating the building. We have had a furnace, as indicated in the sketch, located in the northwest corner of the building, and also two stoves under the organ gallery at the east end. We have no ventilation except the doors and windows. I think we require ventilation rather than additional heat, as we are always warm in the evening and cold in the morning. We are about putting in a new furnace and desire to do the best we can. Any suggestions you can offer will be thankfully received.

*Answer.*—The building shown in our correspondent's sketch is 84 feet long, 37½ feet wide, with an average hight of 26 feet. It is ceiled so as to leave a closed space between the ceiling and the roof. There seems to be a cellar, under one end of which is located the furnace. From it two pipes are carried to registers that occur in the floor of the church between the pulpit and the front pews. At the opposite end of the church, under the organ gallery, as is explained in our correspondent's letter, are located two stoves, each having its own flue. From the construction of the building it would seem to be a difficult matter to provide a single furnace, however large, in a way to warm the building satisfactorily. Were there an excavation at the opposite end two furnaces perhaps could be employed advantageously. We take it our correspondent does not anticipate any change in the general arrangement of the heating apparatus. This being the case there would seem to be very little that he can do except to put in the new furnace, since one is to be introduced, and to make some provision for ventilation. The windows and doors of a church are a very poor reliance for the ventilation that is needed. Without ventilation of some kind furnaces will not work satisfactorily. Air cannot be forced into a room that is already full any more than water can be forced into a bottle that is already full. Some impure air should be taken off, so as to admit fresh air freely, and provision should be made for this, independent of the windows and doors. Our correspondent does not indicate enough of the construction of the building to warrant any specific suggestions on our part as to how this ventilation can be accomplished. Our preference would be to draw the cold air from the floor, thus facilitating the heating, while at the same time admitting the warm air freely. To draw the cold air from the floor would require a heated flue or some artificial means of suction, the best way of providing which would depend upon local circumstances of which we have no information. Since the heat of the stoves is at one end of the room, and the hot-air supply of the registers at the opposite end, a fairly good result perhaps would be accomplished by a ventilating register located in the ceiling, somewhere between the two extremes. This should be constructed so as to make it possible to open or close it, as circumstances may require. With reference to the fact that the church is warm in the evening and cool in the morning, it should be remarked that this in all probability is due to the length of time that the heating apparatus is in operation. If the fire should be started earlier, no doubt the church would be comfortably warm in the morning, and this could be managed without making the building too warm in the evening by judicious management of the fires during the day, and the opening of the ventilators. We have not thought it necessary to engrave our correspondent's sketch, from the fact that all essential features could be described as above.

### Fire-Proof Shingles.

*From* F., *Ontario, Iowa.*—Common shingle roofs are a constant source of danger on account of fire. There is needed a light fire-proof shingle to replace the wooden shingle in common use. I notice that such shingles are now being made of paper. Can you give the readers of *Carpentry and Building* full particulars?

*Answer.*—We do not know that paper shingles are in the market at the present time in a way to be available for the wants of this correspondent. Several patents have been taken out on roof coverings of this nature. The nearest thing to what our correspondent describes at present in the market perhaps is the wood-pulp roofing manufactured by the Bodine Roofing Company, Mansfield, Ohio. A flexible felt shingle, we believe, is made by the Sparham Cement Roofing Company, of Cleveland, Ohio. In this connection we ask our correspondent if the conditions he describes are not fully met by the tin or sheet-metal shingles which are at present largely manufactured by different firms. We would suggest that he obtain samples from some of the concerns whose cards will be found in our advertising columns.

TABLE OF NUMBER OF JOISTS AND NUMBER OF FEET OF 2 x 6 INCH JOISTS IN GIVEN WIDTH AND LENGTH OF BAY, SET 16 INCHES FROM CENTERS.

*Allowance is made for 6 inches at each end to rest in the wall, and one joist each side of bay.*

| Length of joist. | Lgth of bay. | Number of joists. 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | No. of feet in each additional joist. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Width of bay. 4′ 2″ | 5′ 6″ | 6′ 10″ | 8′ 2″ | 9′ 6″ | 10′ 10″ | 12′ 2″ | 13′ 6″ | 14′ 10″ | 16′ 2″ | 17′ 6″ | 18′ 10″ | 20′ 2″ | 21′ 6″ | 22′ 10″ | 24′ 2″ | 25′ 6″ | 26′ 10″ | 28′ 2″ | 29′ 6″ | 30′ 10″ | |
| 5 | 4 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 | 5 |
| 6 | 5 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 | 78 | 84 | 90 | 96 | 102 | 108 | 114 | 120 | 126 | 132 | 138 | 144 | 6 |
| 7 | 6 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 | 91 | 98 | 105 | 112 | 119 | 126 | 133 | 138 | 147 | 154 | 161 | 168 | 7 |
| 8 | 7 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 | 168 | 176 | 184 | 192 | 8 |
| 9 | 8 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 | 117 | 126 | 135 | 144 | 153 | 162 | 171 | 180 | 189 | 198 | 207 | 216 | 9 |
| 10 | 9 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 | 210 | 220 | 230 | 240 | 10 |
| 11 | 10 | 44 | 55 | 66 | 77 | 88 | 99 | 110 | 121 | 132 | 143 | 154 | 165 | 176 | 187 | 198 | 209 | 220 | 231 | 242 | 253 | 264 | 11 |
| 12 | 11 | 48 | 60 | 72 | 84 | 96 | 108 | 120 | 132 | 144 | 156 | 168 | 180 | 192 | 204 | 216 | 228 | 240 | 252 | 264 | 276 | 288 | 12 |
| 13 | 12 | 52 | 65 | 78 | 91 | 104 | 117 | 130 | 143 | 156 | 169 | 182 | 195 | 208 | 221 | 234 | 247 | 260 | 273 | 286 | 299 | 312 | 13 |
| 14 | 13 | 56 | 70 | 84 | 98 | 112 | 126 | 140 | 154 | 168 | 182 | 196 | 210 | 224 | 238 | 252 | 266 | 280 | 294 | 308 | 322 | 336 | 14 |
| 15 | 14 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 | 285 | 300 | 315 | 330 | 345 | 360 | 15 |
| 16 | 15 | 64 | 80 | 96 | 112 | 128 | 144 | 160 | 176 | 192 | 208 | 224 | 240 | 256 | 272 | 288 | 304 | 320 | 336 | 352 | 368 | 384 | 16 |
| 17 | 16 | 68 | 85 | 102 | 119 | 136 | 153 | 170 | 187 | 204 | 221 | 238 | 255 | 272 | 289 | 306 | 323 | 340 | 357 | 374 | 391 | 408 | 17 |
| 18 | 17 | 72 | 90 | 108 | 126 | 144 | 162 | 180 | 198 | 216 | 234 | 252 | 270 | 288 | 306 | 324 | 342 | 360 | 378 | 396 | 414 | 432 | 18 |
| 19 | 18 | 76 | 95 | 114 | 133 | 152 | 171 | 190 | 209 | 228 | 247 | 266 | 285 | 304 | 323 | 342 | 361 | 380 | 399 | 418 | 437 | 456 | 19 |
| 20 | 19 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 340 | 360 | 380 | 400 | 420 | 440 | 460 | 480 | 20 |
| 21 | 20 | 84 | 105 | 126 | 147 | 168 | 189 | 210 | 231 | 252 | 273 | 294 | 315 | 336 | 359 | 378 | 399 | 420 | 441 | 462 | 483 | 504 | 21 |
| 22 | 21 | 88 | 110 | 132 | 154 | 176 | 198 | 220 | 242 | 264 | 286 | 308 | 330 | 352 | 374 | 396 | 418 | 440 | 462 | 484 | 506 | 528 | 22 |
| 23 | 22 | 92 | 115 | 138 | 161 | 184 | 207 | 230 | 253 | 276 | 299 | 322 | 345 | 368 | 391 | 414 | 437 | 460 | 483 | 506 | 529 | 552 | 23 |
| 24 | 23 | 96 | 120 | 144 | 168 | 192 | 216 | 240 | 264 | 288 | 312 | 336 | 360 | 384 | 408 | 432 | 456 | 480 | 504 | 528 | 552 | 576 | 24 |
| 25 | 24 | 100 | 125 | 150 | 175 | 200 | 225 | 250 | 275 | 300 | 325 | 350 | 375 | 400 | 425 | 450 | 475 | 500 | 525 | 550 | 575 | 600 | 25 |
| 26 | 25 | 104 | 130 | 156 | 182 | 208 | 234 | 260 | 286 | 312 | 338 | 364 | 390 | 416 | 442 | 468 | 494 | 520 | 546 | 572 | 598 | 624 | 26 |
| 27 | 26 | 108 | 135 | 162 | 189 | 216 | 243 | 270 | 297 | 324 | 351 | 378 | 405 | 432 | 459 | 486 | 513 | 540 | 567 | 594 | 621 | 648 | 27 |
| 28 | 27 | 112 | 140 | 168 | 196 | 224 | 252 | 280 | 308 | 336 | 364 | 392 | 420 | 448 | 476 | 504 | 532 | 560 | 588 | 616 | 644 | 672 | 28 |
| 29 | 28 | 116 | 145 | 174 | 203 | 232 | 261 | 290 | 319 | 348 | 377 | 406 | 435 | 464 | 493 | 522 | 551 | 580 | 609 | 638 | 667 | 696 | 29 |
| 30 | 29 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 | 630 | 660 | 690 | 720 | 30 |
| 31 | 30 | 124 | 155 | 186 | 217 | 248 | 279 | 310 | 341 | 372 | 403 | 434 | 465 | 496 | 527 | 558 | 589 | 620 | 651 | 682 | 713 | 744 | 31 |

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## REFERRED TO OUR READERS.

### Construction of a Refrigerator.

*From* "M. A. W." *San Diego, Cal.*—If some practical reader of *Carpentry and Building*, who has had experience in such work, will give plans for constructing a large refrigerator he will confer a favor. The refrigerator which I desire to build, for which I seek this information, is to be, inside measure, 3 feet from front to back, 6 feet high and 9 feet long. It is intended for cooling barrels of beer and also bottled goods.

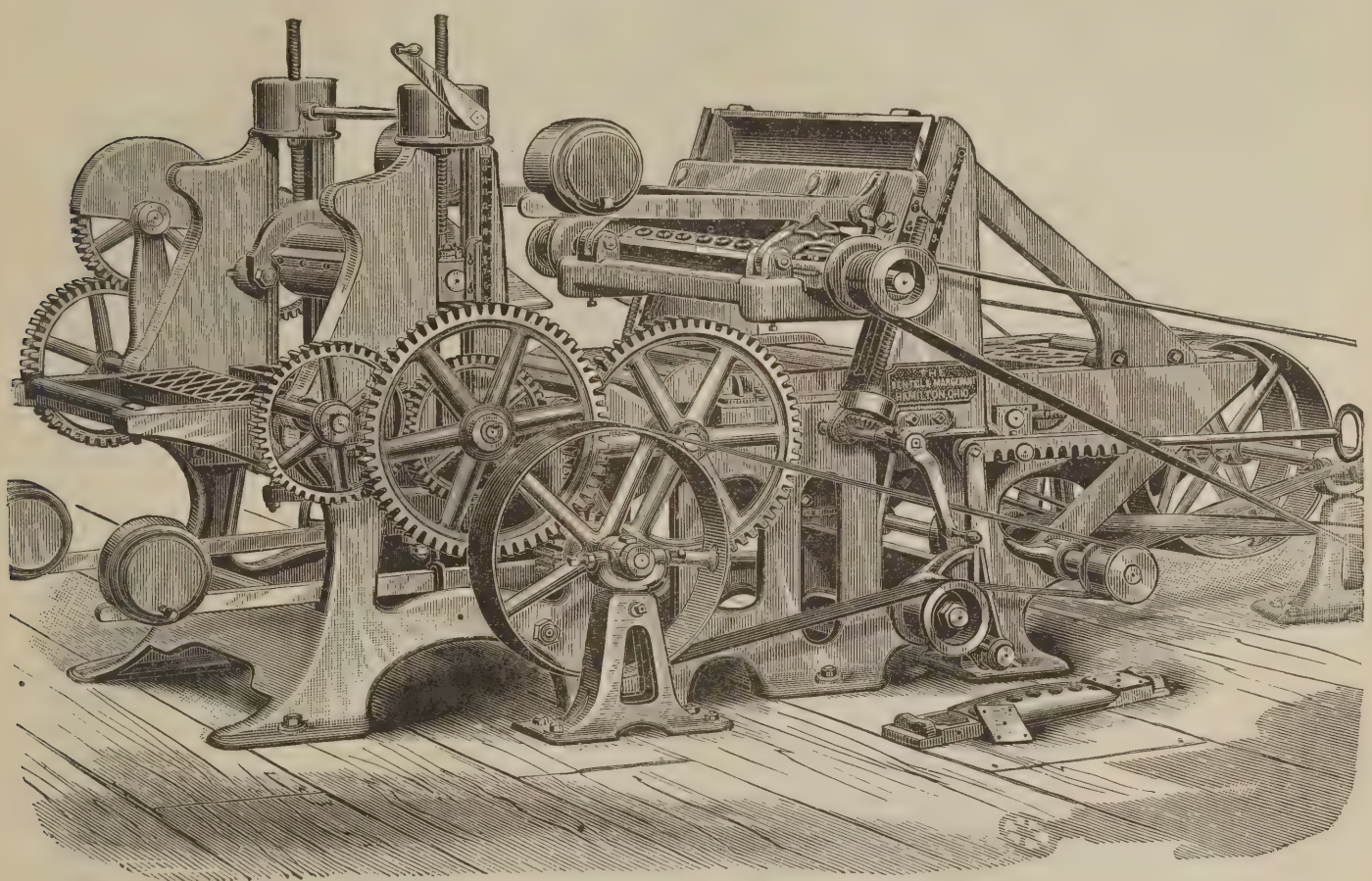
### Framing Purlins.

*From* J. F. M., *Newark, N. J.*—I desire to ask of the practical readers of *Carpentry and Building* which is the best way to frame purlins, at right angles with the rafters or plumb? I ask this question with the understanding that it makes no difference as regards room. What I want to know is, Which is the strongest construction? My own idea is that framing the purlins at right angles is the better way.

# NOVELTIES.

### Double Endless Bed Surfacer.

We show in Fig. 1 a new double endless bed surfacer just put on the market by the Bentel & Margedant Company, of Hamilton, Ohio, and embracing a number of valuable features. In endless bed or chain planers, it must be remembered, the whole bed surface, which in other machines resists the feeding movement, moves on with the material, bringing it under and past the rotating cutter-head. There is nothing in the device to slip, because the very rest or support of the lumber moves along. It is all "go." Notwithstanding the advantages of the chain-feed, however, it has not found its way into all shops where lumber is planed, because in many planers of this class the traveling chain-bed or the supporting slides very soon wear out of line, and require expensive repairing. It is interesting, therefore, to note the manner in which this complaint has been overcome in the machine which we illustrate. Referring to the engraving, which shows in the front one of these series of slats comprising the traveling bed, it will be noticed that the form and design of the slat is novel, being a slat strengthened by a hollow cored supporting brace starting from the ends and increasing in proportion toward the middle, slats. Every slat is "faced" with a hard cast-steel sliding plate which is removable should there be occasion for it. Every slat carries its own permanent supply chamber of lubricating oil, from which the lubricant is uniformly and automatically discharged when needed, and, being hollow, it equalizes the pressure of the air on the two close-fitting surfaces. The steel plates used are not planed or milled to a uniform thickness, but are of standard sizes and measurements, as found in any steel warehouse, ground to a smooth surface after tempering. The rests for the steel plates are all planed carefully to a uniform hight, so that a renewing can be accomplished without the assistance of a machinist. All the various sizes of endless bed planers built by the Bentel & Margedant Company have only two supports for the endless bed, so that an uneven wearing or a rocking motion of the slat or bed cannot take place. The wider planers are supplied with stronger braced slats and broader sliding faces and rails, but all the rails on which the endless bed travels are made in full thickness of the finest tool steel. They are carefully ground by special machinery on the top and bottom to a perfectly true and straight line. Thus arranged they will not cut or wear irregularly, but will soon assume a wearing finish offering only slight resistance to the sliding pressure of the traveling bed. Endless bed planers of this construction



*Novelties.—Fig. 1.—Double Endless Bed Surfacer, Built by the Bentel & Margedant Company, Hamilton, Ohio.*

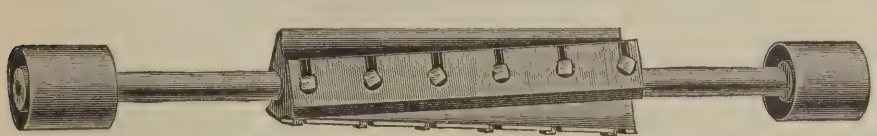


*Fig. 2.—Triangular Cutter Cylinder.*

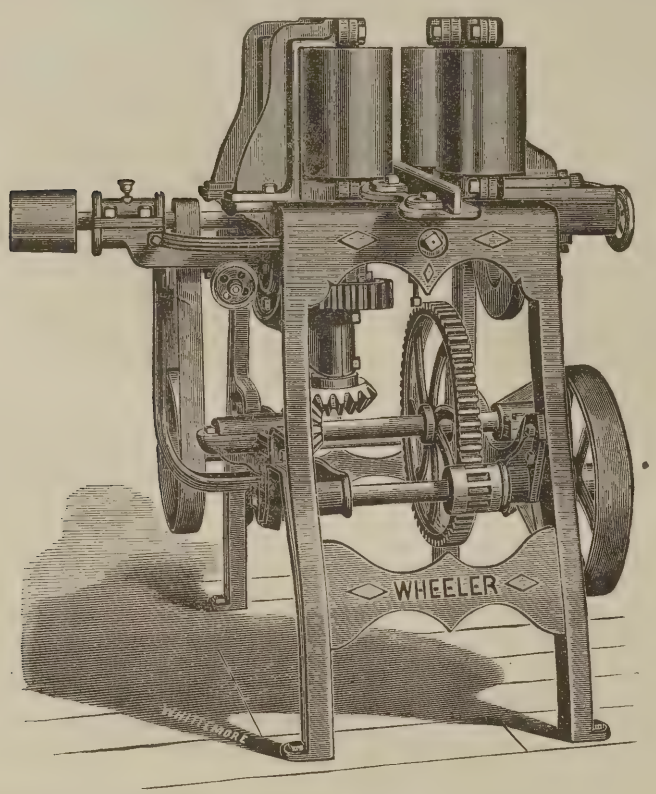
all cast in one piece. One of the ends of the slat shows it with the plate removed, exposing a recessed chamber which is filled with cotton fabric for carrying a quantity of lubricating oil. The other end of the slat shows this chamber covered by a hard cast-steel plate provided with five holes. The center hole is an oil hole, and the four others are for rivets to fasten the steel plates to the have, we are informed, been in constant hard service for the last few years, and none of them have required any repairing or renewing on account of abrasion or cutting of the sliding surfaces. Three different sizes of this machine are made to plane 26, 28 and 30 inches wide. The frame of the machine is built very massive and strong, with a broad rest on the floor. The connections and binding braces which hold the two sides together are made especially strong and heavy, thus forming an unyielding support for the traveling bed, which remains at a uniform hight for all thicknesses of material. It will be seen that this arrangement of a fixed bed insures freedom from trembling and jar, as the framework of the bed binds the machine firmly together. It also does away with the troublesome annoyance of raising and lowering the bed for different thicknesses of material, and with the unavoidable wear of the bed slides and raising screws and with the rocking motion of the bed. It also reduces the work of handling light and heavy lumber,

*Fig. 3.—Differential Sectional Feed Roller.*

as the receiving and discharging trestles can be maintained at a uniform hight, doing away with constant readjustment. The upper cylinder with its heavy housing raises and lowers on inclined dovetailed slides, supported by heavy stands, by means of a crank operating through miter gearing on heavy raising screws. It can be adjusted for planing material up to 16 inches in thickness.

The cutter cylinders are provided with fine steel journals 11 inches long, and are of the triangular shear-knife pattern, as shown in Fig. 2. The three knives are placed at such an angle as to produce a shearing or draw cut, thus preventing any splintering or tearing. It is supplied with a driving pulley of large diameter on each end with momentum disks. The swinging bonnet forms at its lower side a well arranged chip-breaker, situated very close to the cutting line. It swings very conveniently out of the way for sharpening the knives and other purposes. Two heavy-weighted idler rollers are connected with the cylinder housing, one in front and the other in the rear of the cylinder. The pressure on these rollers can

be regulated to suit the requirements of the material, as their office is merely to hold the material in close contact with the traveling bed. An adjustable scraper keeps the back roller free from gum and rosin. For planing strips of irregular thickness the planers are supplied with the Brown differental sectional feed roller illustrated in Fig. 3. It consists of a series of sections, each yielding independently of the other to irregularities in thickness. For many kinds of work this arrangement is of importance, as a number of strips can be fed along side by side, regardless of thickness in the rough. The lower cutter cylinder, where more than one cutter-head is employed, is located at the back end of the traveling bed, and is especially arranged for quick adjustment. It rests in a srong combined housing which retains the long self-oiling journal-bearings in accurate line. It raises and lowers upon long vertical slides provided with adjusting gibs, by means of a crank wrench operating through worm gearing on two vertical screws, insuring simultaneous action and easy adjustment. There are two adjustable tables, one in front and the other in the rear of the lower cutter-head. The one in front can be adjusted in line with the traveling bed. It is supplied with handles by which the whole table can be swung back out of the way, giving free access to the head. As already remarked, the housing of the lower cylinder raises and lowers by a worm and screw device for any required hight above the first table, and independently of it for any thickness of cut. This adjustment can be accomplished while the cutter-head is in in operation. The table back of the cutter-head raises and lowers with the housing, so that it always remains in line with the cutting line of the cylinder. This table can, however, be adjusted for hight if necessary, and can also be lifted entirely out of its bearings without the loosening of bolts or nuts. A resisting pressure-plate of large dimensions operated by combined vertical screws and handles (when no feed rollers are supplied) holds the material firmly down when operated upon by the lower head. When feed rollers are provided the pressure-plate adjusts with the rollers, as shown in the engraving. Graduated scales conveniently placed show at a glance the position and hight of parts adjustable for various thicknesses of material. The carrying-out feed rollers (when provided) are placed in the rear of the lower cylinder. They are 6 inches in diameter, and, as the illustration shows, are very strongly geared with wide, heavy gearing. They are positive and powerful in action and quickly adjustable for variation in material. They are well supported by bracing stands. The lower feed roller, though adjustable independently for hight with the back table of the lower cutter-head, raises and lowers with the cutter-head and back table. Operators will see the importance of this combination, as much time and labor are thus saved in establishing the relative adjustment of these three important parts, which have a fixed relative adjustment, admitting of quick change for thickness of cut while the machine is in operation. The links of the expansion gearing are placed in such a position that they do not twist or retard easy motion. There are four regular changes for the speed of the feed, and changes can also be made while the machine is in motion by means of the handle shown in the cut. This arrangement is important, as it enables the operator to start and stop, or to feed slowly whenever split and cross-grained parts of material are being worked. The weight of the 26-inch machine is 5800 pounds.




*Novelties.—Fig. 4.—The Wheeler Box Board Matchers, Built by the S. C. Forsaith Machine Company, Manchester, N. H.*

### The Wheeler Box-Board Matchers.

The Wheeler Power-Feed Box-Board Matchers, of which we show an engraving, are built entirely of iron and steel, set up as two machines, one for cutting the tongue, the other the groove, each occupying a floor space of 3 feet x 18 inches, with extreme outside measurement of all parts 3 feet 6 inches x 3 feet 4 inches, hight 3 feet 10 inches over all, and are for working any box-board stock that is 12 inches and over in length, of any width, and from ⅜ inch to 1⅛ inches thick. Matches taper as well as straight stock. There are four feed-rolls 6 inches x 8 inches, two rolls power and two idle. The idle rolls are set on a heavy gibbed way, a pressure being adjusted by a 5-inch hand-wheel and screw on rubber spring. The power rolls are driven by strong, heavy feed gearing. The arbors are of steel, and can be belted from above or below. All parts of the machines are readily accessible, and the necessary changes from working thin to thick stock can be quickly and easily made without stopping. The hand-wheel on the right is for adjusting ten rolls, and the wheel on the left for setting the cutters. The bed has a vertical adjustment for obtaining any desired depth of cut. The two machines are capable of matching 20,000 average box-board stock per day. They are built by the S. C. Forsaith Machine Company, of Manchester, N. H.

### Davis Automatic Sash Fastener.

Figs. 5 and 6 represent two views of a new automatic sash fastener which is being put upon the market by F. T. Davis, of Mt. Vernon, N. Y. The first view shows the sash fastener open, and the second shows it closed. By reference to the first engraving the parts of which the device is composed will be readily understood. A plate with a curved hook is screwed to the lower sash, while a second plate, with the moving parts of the device, is fastened to the lower rail of the upper sash. When the hasp is thrown back for the purpose of raising the lower sash the parts assume the relation shown in the first illustration. If when in this position the window is raised, in going up it will have the effect of throwing the fastener back somewhat further than shown in the engraving, but when the sash is lowered the projecting lip of the lower plate engages with a latch-shaped piece pivoted in the hasp, striking it in such a manner as to unloosen the catch by which it is held, causing the hasp to fall by means of the spring which actuates it, and to pass over the hook, the latter in turn throwing back the latch so as to lock the hasp in the new position. The sash is easily unlocked by lifting the catch with the finger at the same time that the hasp is carried up. Inasmuch as the catch works by gravity only, it is very easily moved. The device is recommended by the maker as combining simplicity and strength with durability, and overcoming the necessity of going about the house to see that all the windows are locked. It is positively automatic, and if the window is closed it is locked as described above. The construction of parts is such that it is impossible to open the fastener from the outside. Accordingly it is recommended as burglar-proof. It is very simple in its parts and construction, and there is nothing to get out of order. It also has the desirable feature of holding the sash together, thereby preventing rattling.

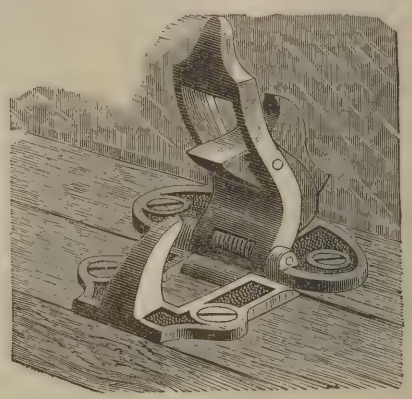


*Fig. 5.—Davis Automatic Sash Fastener Open.*

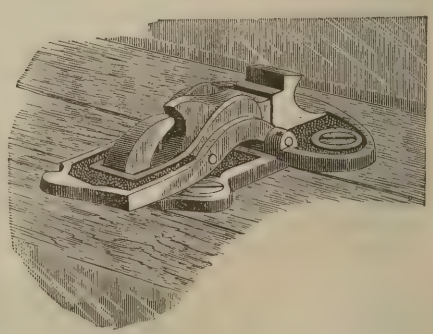
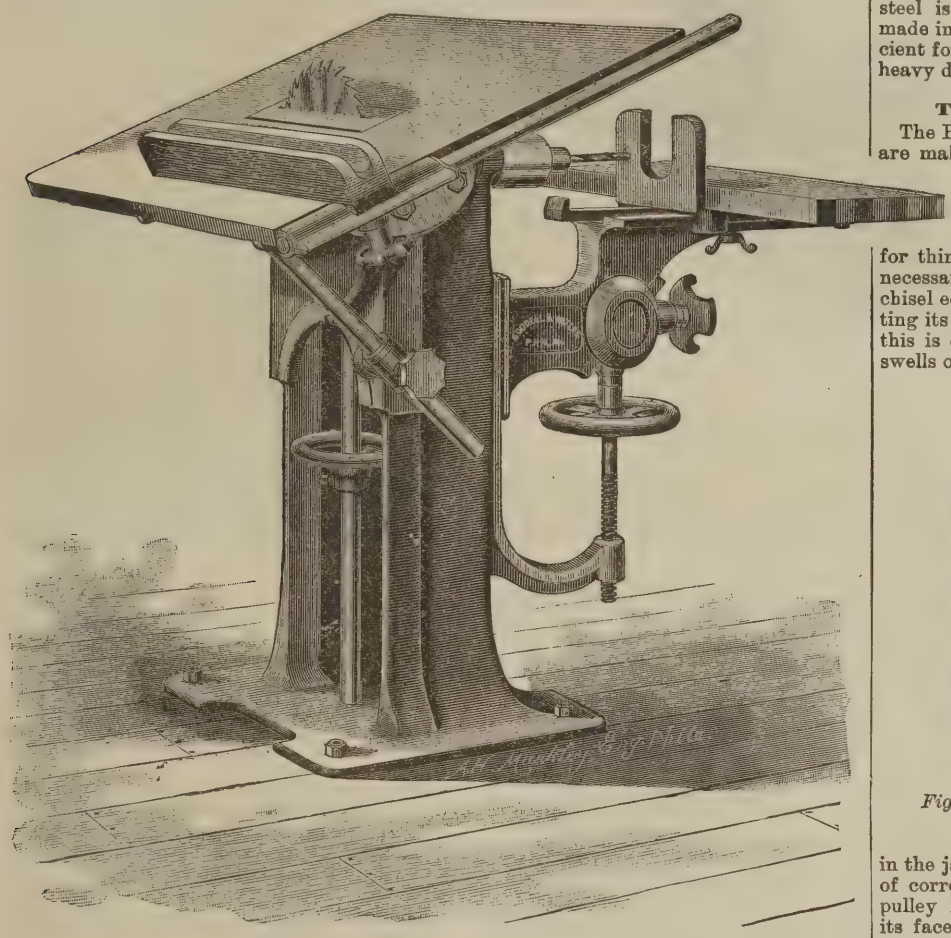


*Fig. 6.—Automatic Sash Fastener Closed.*

### Combined Saw Bench and Boring Machine.

Fig. 7 illustrates a combined saw bench and boring machine built by Messrs. Goodell & Waters, Philadelphia, Pa. It is a very useful tool in almost every shop where a general run of sawing and boring is done. The table is 34½ x 28 inches wide, and can be tilted to any angle up to 45°, and held in position by the bar directly under the table, as shown in the engraving. The various angles at which the table may be set are indicated by the scale on the bar at the fastening screw. By the peculiar construction of the table two very good points are obtained. The perpendicular elevation and tilting of the top are wholly independent of each other; the one movement does not interfere with the other, changes thus not affecting the saw. Saws or groove heads may be used on the arbor as desired, and changes from one to the other may be readily effected. The boring apparatus is at the rear end of the arbor. The boring table may be easily raised and lowered to suit the work by the hand-wheel directly beneath. The table is also provided with a sliding carriage which brings the work up to the bit. The edges of the table are placed perfectly parallel to the saw; consequently cut-off and miter gauges may be applied if desired and still have the top solid and free from all obstructions. The slitting gauge slides on a bar at the front of the machine and is easily moved to the right or left of the saw, thus making it a right or left hand machine at the operator's option or as the work may require. The gauge will open 14 inches. The machine weighs about 500 pounds.



*Novelties.—Fig. 7.—Combined Saw and Boring Machine, Built by Goodell & Waters, Philadelphia, Pa.*

### The Hook Door Spring.

W. S. Barlow, of Paterson, N. J., is manufacturing the hook door spring shown in Fig. 8. It consists, it will be seen, of three pieces, the stud or bracket A, which is attached to the hinge side of the door; the spiral spring D, which with the loops at either end is 7 inches long, and the hooked bar B, by which the spring is connected to the door frame. This hook bar is 5 inches long, and has five hooks by the end, one of which is attached to the screw C in the door frame, the loop on the spiral spring passing over one of the other hooks, thus giving the desired tension to the spring. In the illustration the spring is attached to the second hook, the remainder of the hooked bar being inside the spring. It will be seen that the spring can be tightened or loosened by simply attaching it to one or other of the hooks, and it will also be observed that the force of the spiral spring may be increased or diminished according to the position on the door of the stud A, by which the leverage exerted when the door is open is regulated. It will thus be seen that the spring admits of varied adjustment, according to the requirements of its use. Its simplicity and the ease with which it may be applied, no tool but a screw-driver being requisite for this purpose, and no mechanical skill being required, are points alluded to as advantages connected with its use. The fact that the spring is made of crucible spring steel is also mentioned. This article is made in two sizes, No. 1 with strength sufficient for most doors, and No. 2 for large heavy doors.

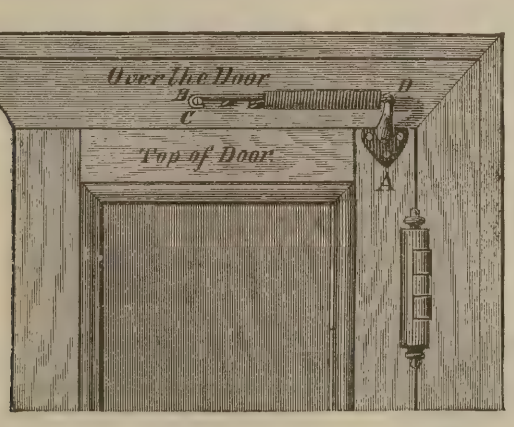



*Fig. 8.—The Hook Door Spring.*

### The Victor Frame Pulley.

The Palmer Mfg. Company, Troy, N. Y., are making the article which is illustrated in Figs. 9 and 10. This pulley, which is referred to as a companion for the company's Common Sense pulley, is designed for frames for thin sashes where a narrow mortise is necessary. One of its special features is the chisel edge on the case, adapting it for cutting its own mortise. The manner in which this is done is indicated in Fig. 9. Tubular swells on the case closely fit the auger holes in the jams, the face-plate being composed of corresponding segments of circles. The pulley has marking spurs on the edge of its face, as shown in Fig. 9, by means of which the centers for the auger holes are readily laid off on the wood. If deemed necessary brads may be driven diagonally in the jam, the heads fitting in the countersinks in the ends of the pulley. The manufacturers allude to the following points of excellences in this pulley: That only three holes are required, in boring which for 1¾ and 2 inches a ⅞-inch bit is used; that the face-plate gives it a better appearance than pulleys having none; that it is held more firmly in the frame than other pulleys not fastened with screws; that it can be applied to the frame very rapidly. It is made in four sizes, 1¾, 2, 2¼ and 2½ inches.

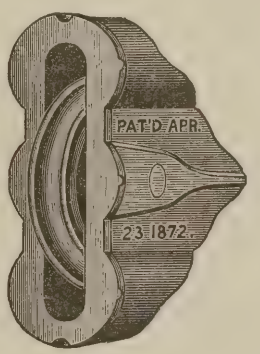
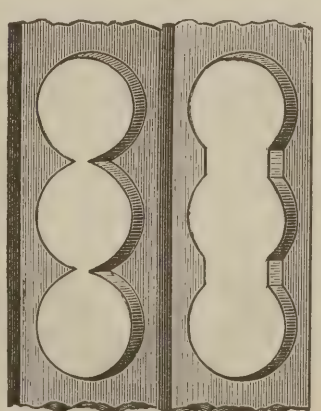



*Fig. 9.—The Victor Frame Pulley.*

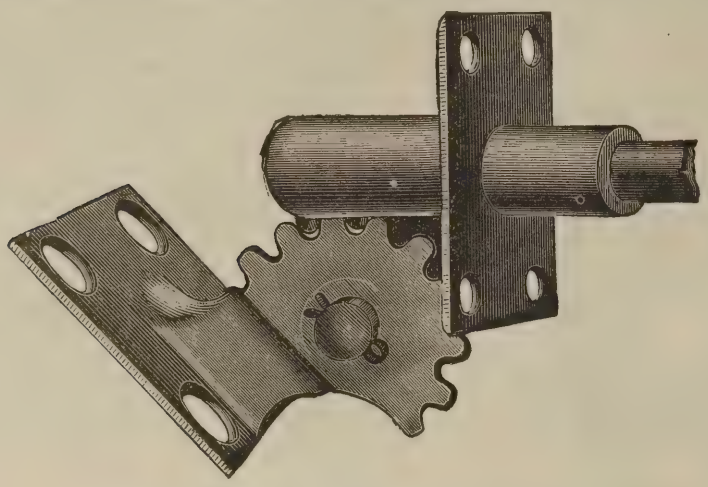


Mortise as made by bit. | Mortise after the Pulley has been driven in.

*Fig. 10.—Mortise for Victor Frame Pulley.*

### The Dodd Shutter Worker.

The accompanying illustration represents the shutter worker now manufactured by the Dodd Mfg. Company, 19 Park place, New York, indicating the changes which have been made in it since we gave a description of the former style in our issue for June, 1885. As at present manufactured all the castings are malleable iron. The worm is entirely covered exeept where it connects with the gear, and a stud and cotter-pin are used for the pintle instead of a screw. By this means it is claimed that much has been added to its efficiency, simplicity and durability. The worker, it will be seen, takes the place of the bottom hinge of the shutter or blind, and is operated from the inside of the room by a rod which passes through the side of the frame, and is made to revolve either way by turning the crank handle. This is the only part of the worker that shows on the inside of the house. Among the advantages claimed for this worker are that the blinds can be put in any desired position from the inside of the room and without raising the window screens or curtains; that they are locked automatically in whatever position they may happen to be left, and hence can never become unfastened; that they cannot be opened from the outside; that the worker can be applied to any house, old or new, and is particularly useful for bay-windows or any position where the old-style catches cannot be used.



*Novelties.—Fig. 11.—The Dodd Shutter Worker.*

### The Boston Miter Clamp.

The illustrations given below represent a miter clamp which is put on the market by C. Fred. Howe, 18 Arch street, Boston. Mass. Its use will be readily apprehended from the illustrations, Fig. 12 showing the miter clamp open, and Fig. 13 representing the position in which it is when closed. It will thus be seen that this clamp has a wrist plate which operates two levers, the points of which enter the wood and force it into place. With this action it will be observed that closing the clamp by moving the handle which is shown in Fig. 12 on the left over to the position on the right, as shown in Fig. 13, binds and draws together the joint and also holds the wood firmly in place, so as to permit the driving of nails if desired, for the insertion of which it will be seen that, as indicated in Fig. 12, openings are left in the clamp. This article is neatly made of malleable iron, and is 8 inches in length. It is intended obviously for cabinet and picture-frame makers, carpenters, joiners, &c., who will appreciate its simplicity and efficiency.

*Fig. 12.—The Boston Miter Clamp Open.*

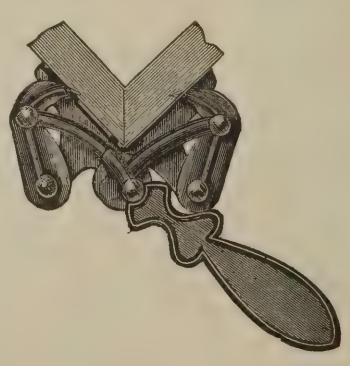


*Fig. 13.—The Boston Miter Clamp Closed.*

### Queen Anne Shingle.

The National Sheet Metal Roofing Company, of 510 to 520 East Twentieth street. New York City, have just ready for the market a new design of sheet-metal shingle which they have named the Queen Anne. This shingle is being manufactured in two forms, both of which are illustrated upon this page. The term "Queen Anne" has been applied to it because by its construction it is particularly applicable to gables and steep roofs where the configuration afforded by the shingle is a part of the design. It very closely resembles tile, cut slate or some of the fanciful patterns of wooden shingles which are in extensive use. It may be called architectural in appearance, and yet features of construction have been carefully attended to. By reference to the engraving it will be seen that the peculiar side joint used in the Walter's shingle is maintained in this. The point of the shingle below the straight part is struck up so as to present a thickened edge, and its own stiffness is relied upon to hold it tight against the roof. As already mentioned, this shingle is being made in two forms, one of which is illustrated in the first of the accompanying engravings, while the other is shown in the third. In the latter a supplementary piece is used in such a way as to facilitate lapping, and, while using less shingles to the square, presents an appearance that by many will be considered more ornamental than that of the first pattern. By comparing the second engraving shown herewith with the fourth the difference will be readily understood. The pattern shown in our last engraving in some respects resembles the egg and dart known in classical architecture, though there has been no attempt to imitate this, so far as we know. The supplemental piece is struck up independently of the shingle itself, and is laid under and lightly soldered in position, as shown in the third engraving. Its use is to make the roof secure with a smaller lap than would otherwise be possible. By comparing our second and fourth engravings the difference in this respect will be noticed.

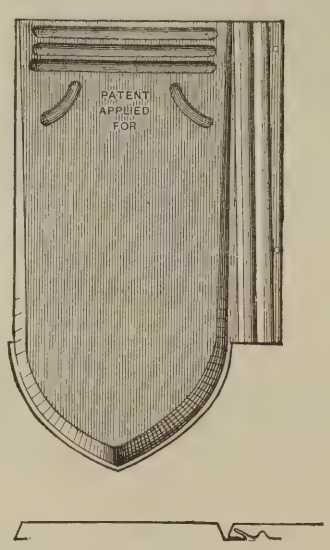



*Fig. 14.—Queen Anne Shingle.—Simple Form.*

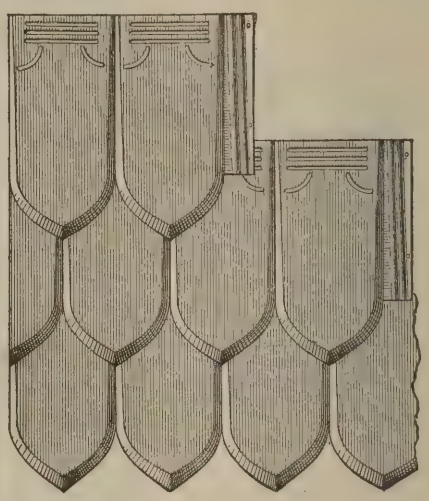


*Fig. 15.—Section of Roof Covered with Queen Anne Shingle, Showing Method of Laying.*

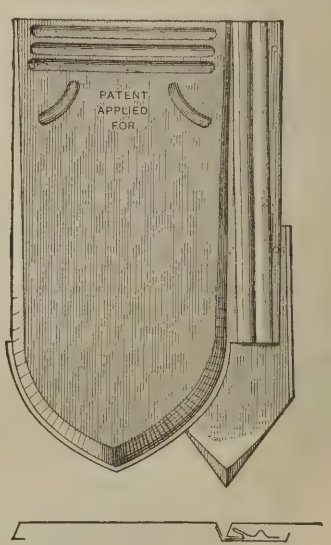
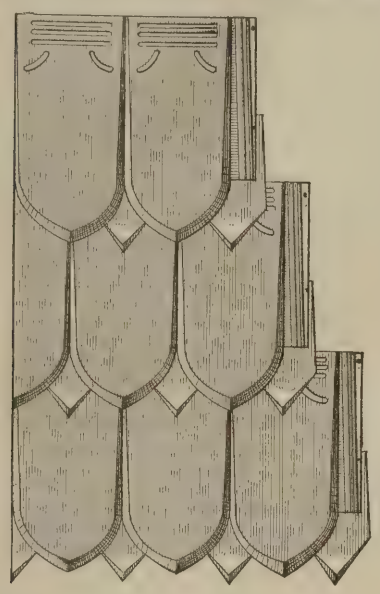



*Fig. 16.—Queen Anne Shingle with Supplemental Attachment.*

Below the first cut is a section taken through the shingle about midway of its length. Below the third engraving is a similar view through the modified form, in which is seen the position occupied by the supplemental piece. The samples that have been submitted to us are made of 7 x 10 tin, and measure a little over 9 inches in extreme length



*Novelties.—Fig. 17.—Section of Roof Covered with Modified Form of Queen Anne Shingle.*

and about 4½ inches in width, exclusive of the side lock. Other sizes, we understand, are in contemplation.

### Lane's Patent Adjustable Stay Roller.

Lane Bros., Poughkeepsie, N. Y., are manufacturing an adjustable stay roller for which John H. Graham & Co., 113 Chambers street, New York, are agents. The article is illustrated in Fig. 18., which, without detailed description, sufficiently indicates its special features. It is made wholly of steel, except the wheel, and may be adjusted, it will be seen, by means of a nut to the thickness of doors, either before or after fastening to the building. The shape is alluded to as insuring great strength. It is also pointed out

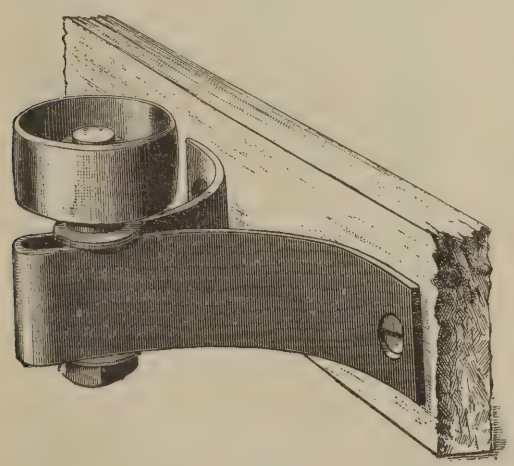


*Fig. 18.—Lane's Patent Adjustable Stay Roller.*

that it is thoroughly braced, and not liable to derangement under hard usage. This article is made under a recent patent, bearing date October 12, 1886.

The ever increasing use of sheet metal in building construction is clearly shown in the list of patents which are granted week by week from the United States Patent Office. An illustration in point is one recently issued to George M. Gill, of Mexico, Mo., relating to metallic panels for doors. The framework of the door is made in the usual manner, omitting the panels. These are then applied of sheet metal, being worked in imitation of the shapes usually given to woodwork, or being formed of simple corrugations at the taste of the designer. The inventor also anticipates the use of metallic panels in still other positions. He says that his invention contemplates not only a new panel and new materials for panels, but also a new and economical method of constructing and inserting the panels in doors, casings, mantel-pieces, ceilings, base boards, stairs, and frontings of buildings, and in furniture and vehicles, and in various articles and places in which paneling, either plain or ornamental, may be desired. The pattern is formed in suitable dimensions and of desirable designs, by stamping, pressing and other available processes. The panel is supplied with a flange, by means of which it can be secured firmly in a desired position by bolts, nails or screws, and by grooves or casings. In its simplest form the author says it is suitable for openings in which the design is visible from only one side, or in which it is sufficient to exhibit the same design of ornamentation on both sides. In its double form, or where two panels or stampings are put in back to back, it makes a panel susceptible of being ornamented on both sides with the same or different designs. The claims in the patent relate to features of construction.

## NEW PUBLICATIONS.

A Manual of Heating and Ventilation. By F. Schumann, C. E. Size 7 x 5 inches, 98 pages. Published by D. Van Nostrand. Second edition. 1886. Price $1.50.

It was Mr. Schumann's object in this manual to give in a concise form the formulæ and data necessary for computing the proper dimensions, &c., of heating and ventilating appliances, with a brief statement of the general principles upon which they are based. The author expressly states that his book is not intended to be a theoretical work, but is a book of reference for those having the necessary theoretical knowledge of the subject. The book is intended for use in this country, and the deductions of European authors have been modified to suit the conditions here prevailing. The present edition is issued under date of March, 1886, and differs from the former in the addition of practical rules and tables for determining size of boiler, grate surface, diameter of steam and hot-water pipes, and radiating surface for both hot-water and steam apparatus. The book opens with general remarks on the subject of heating and ventilation, with brief descriptions and definitions of the different systems employed; the subsequent chapters are on ventilation, heating and hygrometry. A chapter of addenda with which the manual closes contains a number of valuable tables and rules relating to different methods of heating. The chapter on heating, besides general remarks in its introduction, treats of hot-water and steam heating and combustion of fuel. The general plan pursued in the treatment of the subjects of ventilation and heating is first to give formulæ and the tables necessary to their application, and then assume a practical example and work out results by the formulæ given. The book contains much valuable and useful data, and to those at all conversant with the subject has the great merit of conciseness. The subject is clearly and intelligently treated withal, and while presupposing a certain amount of mathematical knowledge in the reader the formulæ can all be applied with at most the use of a table of logarithms. We notice in his treatment of hot-water heating Mr. Schumann states that the water should rise to the highest point in the most direct way, and return through the radiators or coils, as otherwise, so he says, a reversal of circulation might occur. We have never heard of this happening, and think if it were so beyond dispute there would be more oneness of opinion between heating engineers as to the best method of arranging pipes in hot-water heating systems.

Square Root Made Easy. By Robert Grimshaw. Size 3¾ x 5½ inches, 32 pages. Published by *Mechanics*. Price 50 cents.

This little work is intended to supply those of limited mathematical training with the information necessary to extract square roots. While it readily accomplishes its object, there is not much in it for which originality can properly be claimed, and the careful examiner will find the explanations similar in nearly all respects to those given in some of the many books and pamphlets treating of the subject. However, it wil undoubtedly prove convenient to many, as it presents the matter in a compact and readily accessible form.

### Smithsonian Report.

The annual report of the Board of Regents of the Smithsonian Institution, showing the operations, expenditures and condition of the Institution for the year 1884, has been issued. It is only natural to expect to find a large mass of interesting matter in this volume, and the reader will not be disappointed. The information throughout is of decided value, and as a contribution to current scientific literature the book must be highly regarded. The report of the secretary covers 98 pages, the remainder of the volume (802 pages) being taken up by an appendix to this report, and by a general appendix. The latter is, in reality, the record of scientific progress for the year 1884, and in it, therefore, will be found the main portion of the work. It is divided up into sections on astronomy, vulcanology and seismology, geography, meteorology, physics, chemistry, &c., and its examination cannot but be one of the greatest interest. The illustrations are numerous and well executed, and the arrangement of the matter shows that careful attention was given to it.

### Shoppel's Modern Houses.

The fourth number of this serial, the issues of which appear quarterly, is at hand. The volume is quite as attractive as any which have preceded it. The frontispiece contains a colored view of a modern cottage. Following this are 51 designs of modern houses, with plans and brief descriptions. Two designs of stables and carriage houses are shown, and a chapter on overmantels, with a single illustration, is presented. Chapters on landscape gardening, picture hanging and picture frames and removal of house slops add to the general value of the work. The "Habitations of Man in all Ages" is continued.

## Painting Plastering.

A writer in the *Painters' Magazine* gives the following directions for painting plastering-work:

The painting of plaster demands a few observations. White lead and linseed oil, with some litharge as a dryer, are mixed to the consistency of thin cream. On the application the oil is entirely absorbed into the plaster in a few hours. The coat will be sufficiently dry in a day or two, when another, a little thicker, is given, the oil of which is wholly or in part absorbed, according to the nature of the plaster. In a few days a third coat, rather thick, this thickness being regulated according to the absorption of oil from the last coat, with a quarter or less of turpentine, is added, the pigments being also introduced, but when very durable work is required a third coat is put on, thinned with even proportions of turpentine and oil, and then the flatting coat. If the plaster be not flatted the last coat is made of 2 parts to 1 of oil. The surface of the plaster is hardened by the oil and rendered less brittle, this admitting of its surface being washed. To effect absorption quickly the plaster is sometimes given two or three coats of boiling linseed oil, which are soon absorbed, and these are followed by a coat of paint. Carbonate of lead or white lead usually constitutes nine-tenths of the body of the paint. Good quality of this lead is important to durability. Painters have often occasion to com-

plain of the defectiveness of the plaster they have to work on. Unless the plaster is good the lime works out in minute bubbles and destroys the effect of the painting, which can only be corrected by rubbing down and commencing the work over again. Four coats of paint, using white lead and linseed oil, with a small quantity of dryers, are not too much for good work.

## Good Timber.

Professor Rankine, speaking on the characteristics of good timber, says: "There are certain appearances which are characteristic of strong and durable timber, to what class soever it belongs: 1. in the same species of timber that specimen will in general be the strongest and most durable which has grown the slowest, as shown by the narrowness of the annual rings. 2. The cellular tissue, as seen in the medullary rays (when visible), should be hard and compact. 3. The vascular or fibrous tissue should adhere firmly together, and should show no wooliness at a freshly-cut surface, nor should it clog the teeth of the saw with loose fibers. 4. If the wood is colored, darkness of color is in general a sign of strength and durability. 5. The freshly-cut surface of the wood should be firm and shining, and should have somewhat of a translucent appearance. A dull, chalky appearance is a sign of bad timber. 6. In wood of a given species the heaviest specimens are in general the stronger and the more lasting. 7. Among resinous woods, those which have least rosin in their pores, and among non-resinous woods, those which have least sap or gum in them, are in general the strongest and most lasting. 8. It is stated by some authors that in firwood that which has most sapwood, and in hardwood that which has the least, is the most durable; but the universality of this law is doubtful. Timber should be free from such blemishes as clefts or cracks radiating from the center; "cup shakes" or cracks which partially separate one annual layer from another; "upsets" where the fibers have been crippled by compression; "rindgalls" or wounds in a layer of the wood which have been covered and concealed by the growth of subsequent layers over them, and hollows or spongy places in the center or elsewhere, indicating the commencement of decay."

## Chemical Fire Engines.

Speaking of chemical fire engines at the recent Pittsfield (Mass.) State convention of firemen, Capt. E. F. Martin said that in extinguishing fires with a chemical engine the principal advantage lies in being able to do so with little water damage. The efficiency of chemical engines depends a great deal on the good judgment of the person or persons who have the management of them, as well as the officer who has command at the fire where they are called into action. Every one of these machines located within a city limit should have four permanently employed men to manage them, and these men should strive to qualify themselves to the service required. The method of carrying the hose to be used on these engines differs with many, some preferring a "basket," while others a reel. It is seldom that over three lengths of hose (150 feet) are required to reach the fire, and if this amount is placed double upon a reel, with connections to engine and pipe attached, you are obliged to remove but 75 feet before you have the full complement. By this method is avoided the kinking and twisting of the hose, which cannot help being the case when it is laid in a basket or placed single on a reel. Captain Martin recommends the use of rubber-lined cotton hose, because it is lighter and less liable to kink and twist while under pressure. These machines can be arranged so as to throw a large stream, and in his opinion to be the equal of a steam fire engine for from six to eight minutes. To obtain this result they should be furnished with an independent outlet and gate attachment, with free waterway, and suitable connections for 1¼-inch or 1½-inch hose. To this should be attached a ½-inch or ⅝-inch shut-off nozzle. The engines should be double tanks of 75 gallons capacity. Chemical engines have demonstrated their usefulness in no uncertain terms in combating with oil fires. A stream from one of these machines through a ¼-inch nozzle will do more execution than one from an inch nozzle of a steam fire engine in this special line. They are the best of guardians in tenement-house districts. They can be used to a great advantage in buildings adjoining the one on fire, especially where there is machinery with open belt-holes. Statistics of fire insurance show that the fire losses of the country are increasing every year, averaging, as they do, from $85,000,000 to $100,000,000 a year. This great leak can in a great degree be checked by the introduction of the most improved fire apparatus, among which are the chemical engines.

## On a Worn-Out Jack Plane.

'Tis twenty years since first we met;
I brought it new—e'en spick and span;
For work it was already set,
And I a fledging journeyman.

Among its kith and kin of planes
It place was sturdy pioneer—
To smooth the way for others' gains,
Like sons of toil in every sphere.

Alas! poor Jack, I'm grieved to see—
Remembering all we've knocked about—
That you've succumbed—are dead to me—
Another comrade worn out!

We've toiled together day by day
O'er surfaces both smooth and rough;
You've brought me many a pound in pay
For framing timbers free and tough.

You've helped me, too, with many a rhyme,
While hand and brain together wrought,
Unto your music keeping time
Both sense and rhythm have I caught.

But now, poor Jack, your days are sped,
While I still seem both hale and stout;
The next I'll handle in your stead,
Perhaps e'er long will wear me out.

The wealthy housed in mansions grand
Full oft looked down on you and me,
And yet they can't escape the hand
Of death or grim eternity.

Philanthropists are prone to preach
At us like peevish, scolding wives;
But could they practice what they teach,
If doomed to endless, toiling lives?

No matter, Jack; there's rest, 'tis said,
Beyond the grave for workingmen
As well as those called better bred,
So that poor folks meet again.

We were so fond of mirth, dear Jack,
My muse, though sad, as well as I,
Suspects I want a joke to crack—
Tempts me to laugh when I would cry.

Since we were self-amusing, "Jack"—
A trio all unknown to fame—
Till from this world I get the "sack,
I won't forget your worthy name.

Farewell, my fellow-friend of toil,
Sprung from the earth, just like myself!
I'll give you just one coat of oil,
And place you on the lumber shelf.

—*Irish Builder.*

## Niagara Water-Power.

The *American Architect and Building News* discourses as follows concerning a recent scheme to utilize some of the immense water-power of Niagara:

We have not enough familiarity with the region about Niagara Falls to know how far the steps that have been taken to make an international park, which began, we believe, with suppressing certain factories and mills along the river, will actually interfere with all attempts to utilize the vast water-power of the river and fall. Probably the most rabid worshipper of uncontaminated nature would not object to the water's doing useful work for the world if it can do it in so seemly a way as not to affect his delicate sensibilities, and so probably no injunction will be brought against the work which the Niagara River Hydraulic Tunnel and Sewer Company have incorporated themselves to do. The work they are preparing to undertake is a peculiarly interesting and daring piece of engineering, but it seems a possible and reasonable enterprise in spite of its very extravagence of conception. As we understand it the company undertake to construct an enormous mill race in the form of a tunnel bored through the solid rock and superincumbent earth, from a point at the level of the river below the Fall up to a point about a mile above it, and it is said that at this point the head of water will measure about 120 feet. From this point the tunnel is to continue up the river for about 1½ miles, grading so as to be about 100 feet below the surface, the path of the tunnel being about 150 yards from the bank. The tunnel constructed, lateral feeders will be driven to the river, and gangs of turbine-wheels set up with all the shafting and gearing necessary for the operation of 230 mills, each using 500 horse-power, for this is the amount of power it is computed can be brought into service by the proposed work. What this amount of energy can accomplish may be appreciated if one can grasp the idea that the new mills will have at their command more power than the combined mills of Minneapolis, Holyoke, Lowell, Lewiston, Lawrence and Cohoes. Furthermore, it is estimated that the cost of the tunnel and its adjuncts will be about one-tenth the sum that has been spent for hydraulic engineering in the cities just mentioned. As we said, the scheme seems mechanically practicable, owing to the great improvement made of late years in boring tools, which can here be driven more economically than anywhere else, thanks to the limitless possibility which the fall affords of operating them by compressed air. The delicate point of the undertaking would be the connection of the feeders with the river. But with coffer-dams on the outside and the pressure of compressed air behind an air-lock within the work could probably be accomplished without mishap. The doubtful factors are the probable effect of erosion on the tunnel, and the possibility of getting at the machinery in the tunnel when there may be need of repairs.

## Forest Devastation in Japan.

The *Popular Science Monthly* publishes the following extract from a private letter from Dr. Heinrich Mayr, who is now in Japan, in the course of a journey round the world: "The disappointment in regard to forests in Japan which I experienced was keen. The Japanese have sent out many students to Europe to study forestry, and have therefore the reputation of possessing forests; but nothing of that—the mountains are bare, and the forests burned down, just as they are in the eastern part of the Rocky Mountains. Americans might take a fearful warning in regard to the future prospect of their great West; only the landscape will be still more desolate there, because the land is so divided into small holdings that no forest will be raised. Volcanic eruptions in Japan have buried, 100 or more years ago, whole forests of *Sooghee*, as the Japanese call their species of Sequoia. They are again dug up, and people wonder at their size and the fine grain of the wood that has become gray, for which enormous sums are paid for cabinet-work, but they are not practical enough to consider that a careful culture might now cover the mountains again with the same wealth. Perhaps already, in 50 years, America will have reached the same stage; a few monsters of the forest will be admired, and it will hardly appear credible that the ancestors in their greed and ignorance burned down these priceless treasures for an ephemeral gain, and even where not the slightest gain could be obtained by the wanton destruction. The United States possess still the finest forests of the globe, but in the land of haste, hurry and greed, anything which cannot be turned into money at short notice is destroyed. A little more forethought might benefit not only the future but also the present generations. The climate of Japan is not quite so fine as that of the Western United States, but similar results will follow similar causes. Where the land, freed

from forests, is used for agricultural purposes, this forest destruction has a fair excuse; but where enormous tracts of land are denuded for stock-raising, the very means will defeat the end; stock cannot be raised without water, and water will not grow; and, with the disappearance of moisture and forests, hard, tough varieties of grass will alone cover the mountain slopes. Japan is the land of inundations, and the effects of forests upon moisture are here most strikingly illustrated. Every thunder-shower sends its whole quantity of water without delay to the rivers and the sea, and within a few hours a mountain valley has seen a dry channel, a raging torrent and a little brook occupying the same bed; thousands of acres of good land along these numerous mountain streams cannot be cultivated, because the forests are lacking which would retain the moisture and allow it only gradually to seek the river and ocean. We cannot realize enough the consequences of forest destruction. But even arbor-days are only a small remedy; the State alone can own large tracts of successfully cultivated forest land."

### Rendering Brickwork Water-Proof.

Perhaps one of the best linings, says an English exchange, is asphalt, and the hygeian rock composition has been used with success. A mortar that is said to be water-proof is made with lime slaked with green vitriol instead of water. The quantity of green vitriol is dissolved in warm water, the lime is then slaked in the usual manner and mixed with fine quartz sand. For water-proofing brick walls the following mixture has been recommended: Soft parafine wax, 2 pounds; shellac, ½ pound; powdered rosin, ½ pound; benzoline spirit 2 quarts; dissolve these by gentle heat in a water bath, then add 1 gallon of benzoline spirits and apply warm. The mixture is very inflammable, and must be kept away from the fire. We may mention here another method of making brickwork impervious to water, known as Sylvester's process, which was used with success on the Croton Reservoir, Central Park. It consists in the successive application to the walls of two washes—one composed of castile soap and water, and the other of alum and water. The proportions are ¾ pound of soap to 1 gallon of water, and ¼ pound of alum to 4 gallons of water. The walls should be quite dry and clean, and the temperature of air not below 50° F. The soap wash is laid on first with a flat brush and at a boiling heat. After 24 hours the wash becomes dry and hard, and the alum wash is applied at a temperature of 60° to 70° F This is allowed to remain 24 hours, when the operation is repeated until the wall has become impervious to water. The number of applications required will depend on the water pressure to which the wall is subjected. In the Croton Reservoir case, four coatings were found to render the reservoir free from leakage under 40 feet head. Rosin has been used also as a protection against moisture. Five parts of turpentine, heated and stirred in 10 parts of pulverized common glue and 1 part of finely-sifted sawdust are then applied to the wall, which should be cleansed and heated by means of a lamp, so that the composition may run into every crack and joint. Very often a cement lining is of no use to make a tank water tight, especially where the bricks and joints are of an inferior description, and the aim should be to get a composition which, when heated, enters the pores of the brickwork and renders them impervious.

The vast timber resources of the Northwest made available by the opening of the Canadian Pacific Railway are the theme of Professor Simpson, of the University of Glasgow, who recently completed a tour over the new route. He says: "Although the whole of the route between Calgary and the Pacific is rich in timber, it is upon the western slopes of the Selkirk and of the Cascade Mountains that the finest trees are to be met with. These include a great number of varieties, the principal of which appeared to be Oregon pine, hemlock, silver fir, the white mountain pine, the black pine, the red cedar and the maple. Some idea of the importance of these boundless forests, from a commercial point of view, may be gained when the ordinary dimensions of the trees are considered. For instance, few woods are better adapted for frames, bridges and shipbuilding than the pine. In British Columbia this tree often measures 13 feet in diameter near the base, and from 200 to 250 feet in hight. Again, the red cedar, which is a valuable forest tree, abounding in the same district, grows to a hight of 200 feet and measuring 15 feet in diameter at the base. Millions of millions of feet of timber, locked up for centuries past in the heart of the mountains, have now became available for commerce through the opening up of the country by the Canadian Pacific Railway."

## TRADE NOTES

THE ELECTRICAL SUPPLY COMPANY, No. 17 Dey street, New York, call attention in another part of this issue to their fittings for private houses, offices, stores, &c. They also include gas lighting.

IN THE OCTOBER NUMBER of *Carpentry and Building* we presented the drawings of the finish of a drug store at Middletown, N. Y., and credited the same to Mr. Arnold W. Brunner, architect. We have a letter from Mr. Brunner saying that the credit, instead of belonging to him personally, belongs to his firm, Brunner & Tryon. It gives us pleasure to set this matter straight.

IN CONNECTION with the Mechanics' and Traders' Exchange of this city, whose rooms are located at No. 14 Vesey street, there has been inaugerated a building material exhibit. The object of this exhibition is to offer a special opportunity to manufacturers to bring their business directly to the notice of the building trades in New York City. The Mechanics' and Traders' Exchange, which was first organized as a builders' association, has a history of some 50 years, and a membership at present of about 300. An offshoot from it is the Building Material Exchange, which has a membership of about the same number. Probably 100 firms in this city are members of both organizations. The exhibit of building materials and supplies was inaugurated some four years since, and has been patronized by a number of manufacturers located in and about New York.

THE GLEN COVE MACHINE COMPANY, Nos. 30 and 32 Clay street, Brooklyn, to whose machinery we have made reference in the past, are directing attention to heavy fast-feed planing and matching machines, double surfacers and inside molding machines of which they make specialties.

IN THE THEATER recently built for Harry Miner in Newark, N. J, is a chandelier furnished by I. P. Frink, of this city. This chandelier cost Mr. Miner $1500, and is one of the main ornaments of the house. It measures 30 feet from the brass ball at the end of the stem to the plate at the upper extremity of the stem, and weighs 800 pounds. It contains 262 lights, gas and electric. The gas burners are made to resemble candles. The electric lights are incandescent lamps. It is proposed to light the house by electricity, the gas being reserved for use in case of emergency, and for use when very bright illumination is desired.

ROLLED HAND-RAIL IRON is being put upon the market by Shinz & Baerm, Zurich, Switzerland, to take the place of wood hand-rail. A very attractive lithographic circular has been prepared, having for the center illustration a full-size section of the rail, and as auxiliaries views showing the application of the rail to crestings, window balconies, balustrades, stairs, horse-stalls, &c. The process of rolling, by which architectural forms are obtained on the outside of a very thin shell, and by which the interior is made to conform very nearly to the exterior surface, is, we believe, patented. The advantages to which the makers direct attention include among others the following: The iron affords an agreeable resting place for the hand and is nicely formed. It weighs but 2½ pounds per foot, nevertheless it is stiff and requires less stays than other rails. If supported once in 14 or 16 feet it will be sufficiently rigid for all practical purposes. On account of its thinness it does not get so hot when exposed to the sun's rays as heavy cast-iron rails. It is free from the objection of cracking, splintering and rotting which are peculiar to wood hand-rails.

THE SPECIAL AUGURS AND BITS manufactured by J. T. Pugh, No. 3113 to 3121 Market street, Philadelphia, are illustrated and described in the manufacturer's card in another portion of this number. These goods are fully warranted and are hand-made.

A NEW RATCHET SCREW-DRIVER of simple parts and great strength is illustrated and priced in the card of the Ellrich Hardware Mfg. Company, of Plantsville, Conn., on another page.

MESSRS SHARPLESS & WATTS, No. 1522 Chestnut steet, Philadelphia, have issued a very handsomely printed circular descriptive of their open fireplaces and the Ideal bath-tub. The fourth page of the circular has an illustration showing a view of the Ideal bathroom. The circular is of interest to architects and builders in general.

ERSKINE W. FISHER, No. 18 Broadway, New York, is directing attention to the Stettin (German) Portland cement and German asphalt mastic which he imports, and the quality of which is guaranteed. He offers the trade full particulars on request.

AT THE CHEMUNG COUNTY FAIR, Elmira, N. Y., Eugene Curry, of that city, made an extensive and interesting exhibit of goods of his manufacture, consisting of wood carpets, screens, screen doors, &c. The fair closed October 9.

PANCOAST & MAULE, of Philadelphia are directing attention to their improved steam glue-heater, an illustration of which appears in their card in another place. This heater has no joints to leak, and is furnished with enameled iron pots, which have the advantage of warming the glue without discoloration.

THE COMPETITION in roofing plates is having the good effect of putting a large number of old-style plates upon the market and raising the general standard of tin roofs. In another portion of this issue Lyon, Conklin & Co., of Baltimore, direct attention to their specialties and address the trade on the general subject of roofing plates.

A NEW AND CHEAP WORK ON DRAWING, entitled "Elementary Mechanical Drawing," by Frank Aborn, is announced by Van Antwert, Bragg & Co., Cincinnati and New York. The work consists of two parts, entitled respectively "Geometrical Drawing" and "Constructive Drawing." These are preceded by a chapter on drawing tools.

WE HAVE RECEIVED from the Smith & Anthony Stove Company, of Boston, Mass., a copy of their new catalogue describing Hub stoves, ranges and heaters. The work is 5¼ x 8¼ inches in size, embodies nearly 100 pages of text and illustrations, and is bound in covers which at once attract attention. The design consists of a very clever reproduction of a water-color sketch in which the name, address and trade-mark of the company are conspicuous features. Several pages at the opening call attention to the wire-gauze oven-door and the gratifying results accomplished by its use, the company having added this feature to their ranges during the season of 1885. Following

the mention of the wire-gauze oven-door are descriptions of the different styles of ranges and cook stoves which the company are manufacturing. Parlor stoves, heaters, open stoves, grates and air-tight stoves are next illustrated in the order named. The closing pages are devoted to illustrations and detailed description of the company's furnaces. The catalogue is well arranged, contains ample descriptive text and is issued in a form well calculated to invite careful examination.

THE ANNUAL FAIR of the American Institute is at present in progress. The exhibition is up to the usual standard maintained by this organization, and a number of novelties are displayed. The attendance to date has been very encouraging, and at present the exhibition has every prospect of being very successful.

SOME TIME SINCE a test between rival sandpapering machines took place in Cincinnati in the works of the Robert Mitchell Furniture Company. The test was between the Berlin Excelsior machine and the Egan machine. Both machines were handled by experts. The decision was in favor of the Egan machine, and a very complimentary letter which the Robert Mitchell Furniture Company wrote to the Egan Company concerning this matter has been published by the Egan Company in circular form. Among other reasons which the Robert Mitchell Furniture Company present, they say that they prefer the Egan machine because of its greater simplicity and consequently smaller liability to get out of order.

THE FOLLOWING extract from the Albany, Wis., *Vindicator* of October 7 will perhaps interest the readers of this paper who are investigating the subject of fire-proof paints: "In the great fire which burned Murry's Opera Hall on September 27 one large door which was painted with H. W. Johns' asbestos fire-proof paint was the only wood that was not consumed"

WE HAVE received from the Ohio Butt Company, No. 55 Dearborn street, Chicago, a catalogue of their hardware specialties. From the prospectus we learn that in this book goods are advertised only that are made for actual use. The pet theory of the company is that those goods are most profitable to manufacture and to sell which best suit the men who wear them out. We also learn that goods are sold under a guarantee that each article is in all respects as represented and that it will prove satisfactory to the user. Among the goods represented in the book is the Nickel barn-door hanger, with which our readers are already familiar. Several different patterns are shown, including malleable iron. The Nickel parlor-door hanger is similiarly ilustrated, also the Nickel farm gate and spring hinges. The company advertise catalogues of cabinet and builders' hardware.

WM. E. UPTEGROVE & BRO., with office, warehouse, sawmills and yards at the foot of East Tenth and Eleventh streets, New York, have an exhibit of woods at the American Institute Fair that is unusually attractive. Last year the firm made an exhibit, upon which we commented at the time. This year a more extensive display is made. The exhibit consists of mahogany, both Mexican and San Domingan, plain and figured; *Prima Vera*, or white mahogany; English oak and rosewood, all finished in the natural color without staining, which is regarded by this firm as the only proper way to finish such woods.

WE BELIEVE the precise material of which the temple at Jerusalem was covered has never been determined, at least to the satisfaction of modern mechanics. We remember that something has been said about the roof being of gold, but it is fair to suppose that even with the free use of the precious metals in ancient times there was some base of common material upon which the gold was put simply as a finish. It has never been suggested to us until recently that the temple might have been covered with corrugated iron. We say "might have been" advisedly. If it were to be covered at the present time it might be covered with corrugated iron, more especially since some of the enterprising manufacturers of this article have begun sending their goods to Jerusalem. We learn that the Cincinnati Corrugating Company have recently made a large shipment of their corrugated material and also packed standing-seam roofing to Jerusalem, Palestine, Asia. The question arises, What is to be done with this material? Is the temple to be rebuilt or has some Yankee taken the contract to boom the town? In any event the fact is of interest that modern roofing material is being shipped to the holy city.

EZRA L. DEANE, of Holyoke, Mass., appreciating the failings of ordinary T-squares, and their liability to change from time to time with varations of the atmosphere, has devised a construction which will enable any draftsman to correct the errors of his T-square on demand. Inside of the regular head a supplemental strip or head is placed, which at one end is hinged to the fixed portion, and at the other end is held more or less away by means of a screw provided with a jam nut. Accordingly it is possible to set the head one way or the other more or less, as the case may be, in order to bring the blade at exactly right angles with the head, and to fasten it securely in the required position.

WE LEARN from Knisely & Miller, of Chicago, that they have about completed the rebuilding of their shop and office, which were destroyed by fire some months since. They expect to occupy the premises within the next two weeks. The new shop in its appointments is a great improvement on the old building which was destroyed, and the office which the firm will occupy will in all probability be the best and largest in the business. We learn that the firm have done about as much work this year as any in the past, notwithstanding the disadvantages under which they have labored, growing out of the fire.

IN THE RAPID DEVELOPMENT of the Southern States unexpected mineral resources are being discovered constantly. One of the latest additions to the already long list is a "mountain" of slate in Tennessee. According to the newspaper reports, this material is within easy water carriage of Chattanooga. It is not supposed that it will affect the Eastern market, but it is expected that it will provide the Southern States with a cheap and durable roof covering to take the place of shingles, which are in very general use.

MESSRS. C. B. ROGERS & CO., of Norwich, Conn., have issued a new catalogue devoted to the interests of their wood-working machines. In this catalogue they have retained only such of their older machines as have by continued service demonstrated their value, and have introduced a large line of entirely new designs brought out during the past year. The catalogue covers 66 pages, and is profusely illustrated, illustrations and descriptive matter alike bearing evidence of careful attention. Among the machinery shown we note a flooring machine, planers and matchers, surface planers, hand planers, molding machines, sash machines, gaining, mortising and boring machines and a large line of others.

IN A NEAT CATALOGUE just issued by the Illinois Iron and Bolt Company, of Carpentersville, Ill., we find an extensive list of copying presses, press stands and attachments turned out by that company. Twenty different styles of presses are shown, and tables of sizes and prices are given which will enable intending purchasers to make selections which will satisfy their requirements. The manufacturers claim special advantages for their presses in point of material and workmanship, and guarantee them to give every satisfaction within reasonable limits of pressure.

WE ARE IN RECEIPT of a handsome little pamphlet issued by the Barber Asphalt Paving Company, descriptive of the work done by the company, and accompanied by lists of pavements now in existence, testimonials, certificates, &c. The only illustration in the pamphlet represents a vertical cross section through a street, showing the sidewalk, curb, asphalt roadway, foundation, &c. We have received from the same company a larger work devoted to the same general subject, but containing in addition a history of asphalt paving, with many interesting statistics. The book is of unusual quality for an advertising medium. Heavy plate paper is employed, and the letter-press is of the best character. The margins are wide, and in various particulars it compares well with many of the choicest art books that are issued from time to time. It contains 168 pages, and is intended for the perusal of those who have contracts to place. The company are at present engaged in laying a pavement on Chambers street, this city, from Broadway to Centre street.

MR. L. W. WALLACE, secretary and treasurer of the National Sheet-Metal Roofing Company, New York City, started on Thursday for an extended business trip through Oregon, Washington Territory and California, expecting to be gone about two months. The company's business is growing steadily in that section of the country.

THE LEADING CITY of the Northwest is nothing if not enterprising. Accordingly the volume that has recently been issued by J. M. Elstner & Co., descriptive of the industries of St. Paul, is only characteristic of that city. The book is in pamphlet form, with nearly 200 pages, and in addition to numerous illustrations contains a brief description of the business of several hundred firms and corporations in that city. Among others mentioned in which the readers of this column will feel a special interest we note the Scribner-Libbey Company. In the half-page devoted to this establishment reference is made to their unexcelled machinery, large force of skilled workmen, and their very extensive business, which extends throughout the Northwest. Mention is also made of several of the more important contracts which they have executed within a recent period, and personal reference to the officers of the company is included.

M. EHRET, JR., & CO., of Philadelphia Pa., have recently completed the job of roofing the mammoth structures known as the State Fair Buildings, at Dallas, Tex. About 2500 rolls of roofing material were required. The same parties roofed the State Fair Buildings at Raleigh, N. C., and over 2000 rolls of felt were employed in the operation.

## Coloring Bronze or Brass.

For a number of years past wonderfully well-colored articles of bronze have come from Paris which rapidly gain in favor. The bronzing shows all the tints from a dull yellow to reddish brown, red and almost black, and adhere thoroughly to the metal. The method of manufacture was long kept secret, and the other recipes generally known to prepare such colors never yielded such good results. It now appears that the secret lay in the use of solutions of sulphides of antimony and arsenic, which were applied to the bronze or brass articles. After thoroughly washing them with water, since every trace of acid left in pickling would show black spots, they are thoroughly dried, and then the sulphide solution is applied with a brush. The best way is to begin with a dilute solution of ammonia, giving one application. After drying the coating is brushed, and then the dilute solution of sulphide of arsenic in ammonia is used, which produces a yellow color. The oftener this sulphide of arsenic is applied the browner will be the color, and a deep tint may thus be finally obtained. By solutions of sulphide of antimony either in ammonia or in sulphide of ammonia the tint is reddish, and it is possible in this way to obtain either the most delicate red or the deepest dark red. If some of the parts of the article are rubbed more strongly a high metallic luster is obtained. Ammonia or sulphide of ammonia reabsorbs the bronzing, and in this way defective spots may be improved. It is possible also to use solutions in caustic soda or potash or the sulphides of either.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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## NOTES AND COMMENTS.

THE PRESENT ISSUE brings the eighth volume of *Carpentry and Building* to a close. It is sometimes customary on such occasions to give the readers of such a journal as this some particulars concerning the features of the volume for the new year. We have never been very careful, however, to observe the rule, preferring in most cases to let the performance speak rather than the promise. For this reason we have very little to offer at the present time, further than to say that the record of the paper in the past is its guarantee for the future. Although no announcement of competitions is made, our columns will not lack for attractive and interesting house studies during 1887. We already have in hand a number of designs by competent architects which will be engraved and published during the year. We have also a number of important articles relating to matters of construction that will be more than usually valuable to our readers. Our department of "Correspondence" will be fully sustained, and all the leading subjects of interest to builders, including stair-building, hand-railing and problems in draftmanship, will be discussed in it by practical men. But, as we said at the outset, our policy always has been to let what we do speak for the paper rather than the description of what we are going to do, and therefore we refrain from further particulars. We wish one and all of our readers a happy and prosperous New Year.

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SHORTLY AFTER the recent earthquakes the Mayor of Charleston received a letter from an English architect directing his attention to the benefit of mixing sugar, treacle, infusion of malt, &c., with the mortar used in the rebuilding of the city, as the addition would greatly increase its strength. The suggestion, it appears, was based on the excellent results that had attended the use of malt in mortar for a building that had been erected many years ago, for when afterward torn down it was found that the joints of the masonry were exceptionally strong—in fact, gunpowder had to be used in demolishing the walls. The only explanation offered was that water to which sugar has been added dissolves 14½ times more lime than pure water. Further evidence of the extraordinary tenacity of mortar made with an addition of saccharine matter is given by correspondents of the London *Times*. One writer stated that cane sugar and lime formed a definite chemical compound, and that finely powdered lime and brown sugar mixed together with water formed a mortar that would join stones and even glass with great strength. The necessity of having the lime thoroughly air slaked was pointed out, else the after slaking and swelling of the small particles would break the joint. The claim was made that this mortar was equal to Portland cement, and that the strength of the latter even could be improved by the addition of sugar. The experiments thus far made with this new mortar have been very successful, but it remains to be seen whether the advantages are sufficient to warrant the use of material so comparatively expensive.

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IN THE further discussion of the subject reference was made to a wall that was built in Madras about a century ago. When the wall was removed in 1859 it was found exceedingly difficult to remove the mortar from the bricks. The cause of the excessive strength of the mortar was not discovered until on reading the original specification for the wall it was found that it required that the mortar should contain a certain proportion of "jaggery," or unrefined sugar, mixed with shell lime and river sand. Other writers testify to the use of sugar in Indian mortars and cements, and from the concurrence of so many opinions it would appear beyond doubt that some special virtue attached to the use of sugar for the purpose mentioned. An inference drawn from these facts, that the extraordinary hardness and tenacity of the mortar used in old Roman masonry is perhaps due to an addition of saccharine matter, is, we think, hardly justifiable, for it is well known that mortar of the ordinary kind, if properly prepared, will with age materially increase in strength. The practical value of this discovery, if we may so call it, is at least limited, for, while the necessity of securing great strength in certain engineering works would admit of the extra cost of using sugar, the item of expense would preclude its use for all ordinary masonry. If the new mortar is in every way equal to Portland cement it has a wide field of usefulness, but this is a question that remains to be proved.

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ON THE 1st of November the Technical School of Cincinnati was formally opened in the Art Rooms of the College of Music, in that city. The establishment of this school is due originally to the efforts of a committee of the Order of Cincinnatus, which, having investigated the subject of industrial education during the past summer, reported favorably upon it, and, with the assistance of the Cincinnati Commercial Club, succeeded in collecting enough money from those interested in the work to start the school. It is the only institution in Cincinnati, so far as we are aware, where manual training is the principal object of instruction. The Cincinnati Art School and the Ohio Mechanics' Institute are doing excellent work, but they do not make a specialty of what is strictly known as manual training. The wood-working department of the school is fitted with work benches and complete sets of tools are provided for the use of the students. Adjoining this is the schoolroom, where the students will attend lectures, and in the rear is the drawing department, where designs will be drawn for all work previous to the actual operation. All the shopwork will be taught with a view to instruction solely; no special trades will be taught, neither will any articles be manufactured for sale. The arrangements for instruction in iron-working are not yet completed, but will include fitting, turning, drilling, planing, &c., and also the care and management of steam engines and boilers. The course of study proposed for the first year, but which will be subject to such changes and improvements as experience may dictate, are arithmetic, algebra and the English language, history, physiology and physical geography, embracing the features of the earth's surface, its atmosphere, climate and various animal and mineral productions, freehand and mechanical drawing. The shopwork of the course will consist of carpentry, wood carving, wood turning, pattern making and the proper care and use of tools. The above course also includes the application of the principles of geometry and its relation to arithmetical calculation. The school is under the personal supervision of Mr. George R. Caruthers, a graduate of the St. Louis Manual Training School.

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THE GREAT STRIKE recently ended in Chicago is the most notable that has occurred since the strike on Gould's Southwestern railroads, and, like that, ends in the discomfiture of the strikers. Hence it appears that results do not depend altogether on the numerical strength of those who are dissatisfied. Although the strike of packers at Chicago lasted only a single week, the consequences are a serious derangement of trade, affecting the workmen not less than the employers, as the demand for labor is cut off in a large measure until the business can be restored to a normal condition, and this at the beginning of winter. Credit is due to Mr. Powderly for his timely intervention before the situation became more aggravated. All of the workmen resume their places so far as they have not been filled by newcomers, and this without regard to organizations with which they may be connected. It is stipulated on both sides that changes shall not be made without two weeks' prior notice. A peaceful condition, however, can hardly be expected so long as union and non-union men are working together, and the end can hardly be foreseen. It is to be noted that in restoring order the Knights of Labor were less tractable than the trades unions and acquiesced with reluctance.

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THE UNION LEAGUE CLUB of Philadelphia have built a charming extension to their clubhouse, with an entrance on Moravian street, locally known as the Union League Assembly Room. It is perhaps the finest hall in the city for the purposes of a public banquet, and indeed the only one, so far as we know, which is worthy of the enterprise of that great city. But, for some reason which it would be well to find out experimentally, the room is utterly unsuited for any kind of public meeting. Its acoustic properties are such that, while footfalls and the rattle of dishes are magnified beyond all reason, a speaker needs the lungs of one of the bulls of Bashan to make himself heard half its length. At a banquet of the iron trade, served in this remarkable room a

short time since, the chairman was not heard 20 feet away, and of those who responded to toasts few, if any, were able to make themselves understood. Under such circumstances speaking is a most distressing excercise. A happy phrase or a felicitous play upon words loses all point if roared as a drowning man might roar for help, and no story is amusing, however funny in itself considered, if the narrator turns purple in the face in telling it. In these respects Philadelphia's charming banquet hall is a failure. If the difficulty is remediable it should be remedied, even if the whole scheme of ornamentation and decoration has to be changed. If not, those who organize public dinners would do well to give it a wide berth. Acoustically it is a monumental failure.

THE Industrial Education Association, of New York, which has hitherto occupied the house No. 54 East Eleventh street, a few days ago opened its new building at No. 9 University place to principals and teachers in order to allow them to visit the building and learn the methods of its work. The building has been carefully prepared for the reception of youthful inmates, and, with the exception of a few exhibits which have not yet been unpacked, all is in readiness. The underlying principles in which instruction is given are drawing, clay modeling and construction. In the large room called the "museum" there will be permanent exhibitions of industrial handiwork. There is a big carpenters' shop fitted up with benches and tables where the models which have previously been made in cardboard will be constructed from wood. After the course in drawing the boys will be sent to this room and the girls to the sewing department. About 400 boys can be accommodated in the carpenter's shop and about 600 boys and girls in the lecture-room each day. In that room domestic economy and sanitary laws will be discussed.

A WRITER in a late number of the *Popular Science Monthly* is very much exercised concerning the present method of heating houses, and tries with vivid emphasis to make the reader believe that the modern house as ordinarily heated, if not the very portal of the tomb, is at least a covered entrance to the gate of death. The cause of his excitement and the source of all the evils which he sees crowding in around us is the ndirect heating systems of the present day. We do not mean only what are commonly known as the indirect steam and hot-water heating, but every system other than those which imply direct radiation from naked flames or glowing coals or embers. In other words, he is a firm believer in the virtues of the open fire. His argument may be briefly summarized. In the first place he assumes that pneumonia and its kindred diseases are due to the shock arising from passing from a 70° to 80° room out into a zero or 32° atmosphere; that the lungs of human beings as ordinarily constructed cannot sustain such sudden changes without serious injury. Further, as people will persist in going out in winter weather, and as the frigid atmosphere cannot be tempered artificially, it is necessary that the air within buildings be kept at a lower temperature, so that the contrast shall not be so pronounced. The writer next proceeds to show that the conditions of physical comfort do not necessarily depend upon a highly-heated surrounding medium of air, but that the pleasurable sensation of warmth may be obtained from radiant heat, though the temperature of the atmosphere not be more than 50° or 60° F.

FIFTY YEARS AGO, says the writer, there were few furnaces or close stoves and no steam-pipes for warming, open fires being the sole source of heat relied upon within doors, and he would have us believe that since the introduction of these modern lung destroyers the human race has been suffering and dying from their ill effects. We are told that by the general adoption of open fires in place of the appliances above mentioned the death rate in the winter months would be materially lessened, and that all this good would happen without entailing the sacrifice of any of our creature comforts. One point, however, which we think of considerable importance the writer has not given enough attention to. How, we would ask, is an open fire going to warm both sides of a body? A person may sit in front of a roaring fire until his face and hands are almost charred, but if the air in the room be cold the shivers will chase one another up and down his back and force him to turn about continually. The remedy suggested for this difficulty is to have the walls and ceiling of the room made of tin plate, tastefully decorated with stamped designs, so that the radiant heat of the fire will be reflected back and forth from every part of the room until each square inch of the walls becomes, as it were, a miniature open fireplace. Even if the public could be persuaded to return to the heating systems of the last century, we very much doubt if they would be willing to reconstruct the interior of their dwellings in conformity with this novel idea, There is much to be said in favor of what is known as radiant heat as a means of warming rooms, but we fail to realize the enormous advantages that would accrue from having the atmosphere of dwellings kept at 60° instead of 70° F.; the lessened difference between the inside and outside air seems insufficient to effect any great benefit.

THE YEAR just closing has been one of remarkable building activity in Philadelphia. According to a local paper the past season has been the most remarkable for improvements, inaugurated and completed, in the history of that city. The record of the buildings projected and completed thus far, with a fair estimate for the months of November and December, still to be heard from, gives a grand total of 9108 buildings to be credited to this memorable year. This is 1144 more than were erected in 1885, which had beaten the record of all previous years by over 1500 buildings. The dwellings erected this year number 6335, 4722 of which are two-story structures, 1587 three stories high, and 26 four stories high. During the past year there were built 32 churches and chapels, 4 public homes, 2 hospitals, 2 colleges, 1 convent, 9 schools, 6 halls, 5 mills, 73 factories, 24 dye and dry houses, 113 shops, 6 banks, 3 foundries, 7 breweries and 8 warehouses. Additions, alterations and rebuilding of old dwellings, stores and factories were common during the past year.

THE REPORTS of the inspectors of factories which have just been issued in Berlin show that the employees in most of the German factories work 11 hours daily, not reckoning overtime. With overtime the workmen in some districts, notably Dusseldorf, work from 36 to 48 hours at a stretch, though they are supposed to have liberty to quit after 24 working hours. The usual hours of a boilerman in Dusseldorf are 12 and often 24 hours. In Magdeburg artisans work 12 hours, in Hanover 10 and in Amsburg 11. The steelware and iron apprentices in Dusseldorf often work 16 hours daily. In the Fürth glass works the men work six days unceasingly, except for two hours, when they sleep in corners of the workshop. The general impression from the reports is that there is much overwork and a bad arrangement of hours with hideous sanitary conditions.

## THE PLATES.

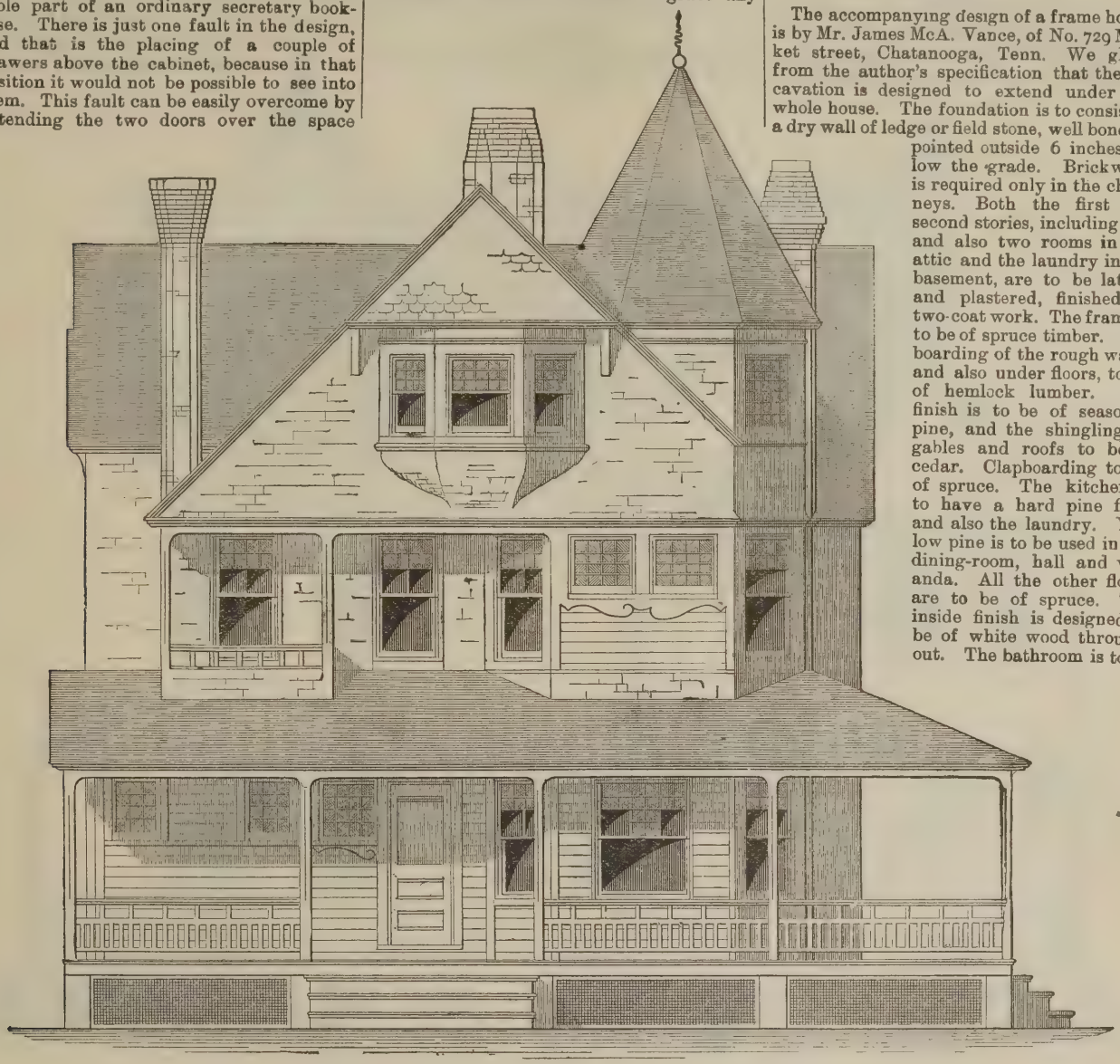
In Plates XLV to XLVII, inclusive, we present the elevations, a portion of the plans and some of the details of a design for a house, estimated to cost about $4500, prepared by John L. Wees, No. 829 North Fourth street, St. Louis, Mo. According to the particulars furnished us by the author of this design, the house is intended to be built on a 50-foot suburban lot, and is intended for the occupancy of a gentleman who has his business in the city, but prefers to live in a country home. The interior arrangements have been carefully studied with the object of making the house economical in size and comfortable as a residence. On entering there is reached a small entrance hall or vestibule through which the visitor passes by means of a curtained arch into the staircase, hall or sitting-room. To this part particular attention has been paid in order to make it a place for retirement. It is not necessary to pass through it to get to other parts of the house for those who enter by the front door. The author also directs attention to the convenient means of communication between kitchen and dining-room, kitchen and cellar, and from the several rooms in the house to the yard. On any occasion, where the same would be desired the three main rooms can be thrown together, virtually constituting one large room. On the second floor there are four good-sized bedrooms and a servants' room. The latter is entirely separated from the rest of the house by means of the door in the side hall. The bathroom is conveniently located so as to be reached from the different rooms of the house. Each of the rooms in the house is supplied with ample closet space, and there is also a large linen closet in the hall. The design is such as to admit two extra rooms in the attic. Our readers will observe the low ceiling to the vestibule, caused by the platform of the stairs. The author has been disposed to utilize space in this design, even at the sacrifice of what would be considered by many as very desirable features. We allude to this simply because many may regard the design in this particular as an oversight or error. Having directed the author's attention to it, we are informed that it is not in error, because he conceives that such a feature would please many people for whom such a house would be built. Our readers will notice that this feature can be readily changed without alterations in other respects, should the house please in its general arrangement.

In Plate XLVIII we present a design of a secretary bookcase in which we imagine a great many of our readers will take more than passing interest. Furniture forms in the past few years have undergone what may be described as topsy-turvy treatment, but the old and well-known type of secretary bookcase has been pretty much let alone. It is a type that can be readily built by the amateur, and is one that is serviceable whenever it may be employed. It is plain in its general features, and yet it is susceptible of some decoration, and that, too, with advantage to the user. What we show in the plate referred to differs from the general run of such articles. The upper part contains a fair amount of accommodation for books, while the recesses at the side would be found very convenient for the storage of oft-wanted volumes in the shape of dictionaries, railway guides, and, in the lower portion, portfolios, waste-paper basket, slippers, &c. Ample accommodation for writing is afforded by the falling flap in the center, which, when resting upon the two runners at the sides of the drawer

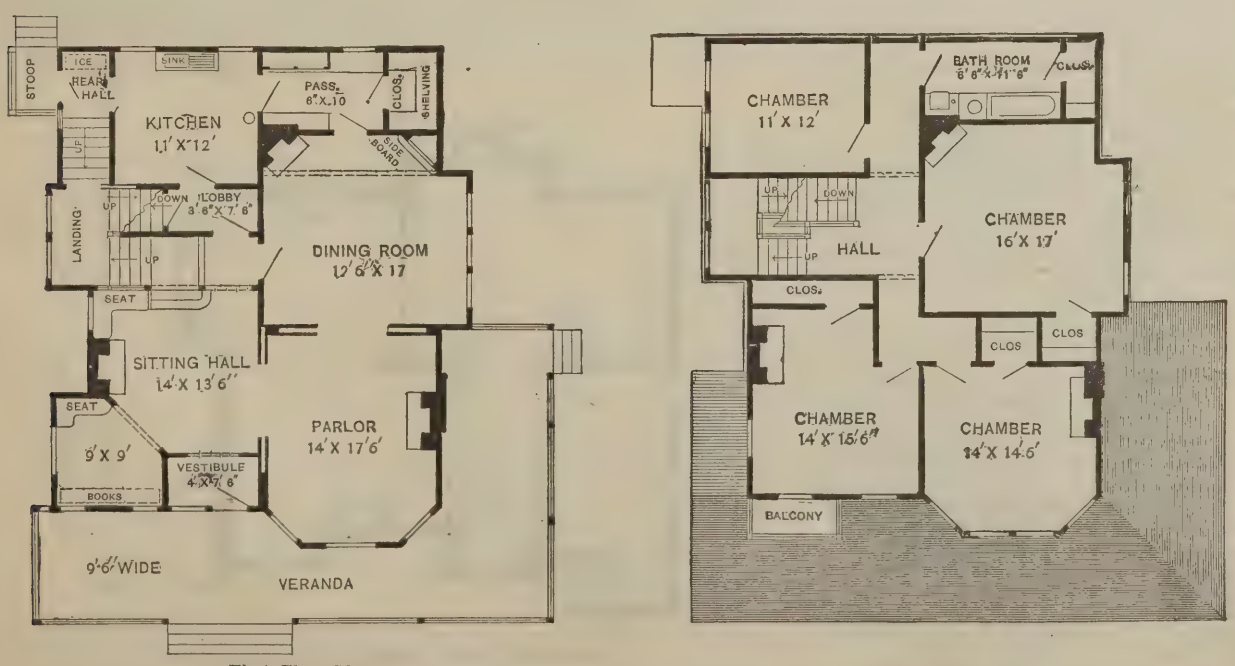
below, forms a most convenient slope, very much easier for work than the flat writing-table part of an ordinary secretary bookcase. There is just one fault in the design, and that is the placing of a couple of drawers above the cabinet, because in that position it would not be possible to see into them. This fault can be easily overcome by extending the two doors over the space which is now occupied by the unreachable drawers. As will be observed, an attempt has been made to give the design a Chippendale feeling, and, if made in darkened mahogany, with the bits of decoration, either inlay or carved, shown in the panels, it is an article which would not disgrace any study. It could, of course, be made up in plainer style for less money where desired. Not a few needy literary men would be glad of such a convenience if only produced in stained pine at kitchen-dresser price.

## Frame House.

The accompanying design of a frame house is by Mr. James McA. Vance, of No. 729 Market street, Chatanooga, Tenn. We glean from the author's specification that the excavation is designed to extend under the whole house. The foundation is to consist of a dry wall of ledge or field stone, well bonded, pointed outside 6 inches below the grade. Brickwork is required only in the chimneys. Both the first and second stories, including hall and also two rooms in the attic and the laundry in the basement, are to be lathed and plastered, finished in two-coat work. The framing to be of spruce timber. The boarding of the rough walls, and also under floors, to be of hemlock lumber. The finish is to be of seasoned pine, and the shingling of gables and roofs to be of cedar. Clapboarding to be of spruce. The kitchen is to have a hard pine floor and also the laundry. Yellow pine is to be used in the dining-room, hall and veranda. All the other floors are to be of spruce. The inside finish is designed to be of white wood throughout. The bathroom is to be provided with plumbing fixtures, and a cast-iron sink and a 40-gallon boiler are to be located in the kitchen, with the necessary fittings. The author's estimate of cost on this building is below $3500.



*Frame House Designed by Mr. J. McA. Vance, Chattanooga, Tenn.—Front Elevation.—Scale, ⅛ Inch to the Foot.*




First Floor Plan. Second Floor Plan.

*Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.*

## Fire-Extinguishing Powder.

A German physicist directs attention to a method of extinguishing fires which was first brought to public notice several years ago. He recommends for closed places, where the use of water or other liquids would be likely to do great damage, a dry compound which, by its burning, absorbs the oxygen and quickly renders combustion impossible. The compound is composed of powdered nitrate of potash (saltpeter), 59 parts; powdered sulphur, 36 parts; powdered charcoal, 4 parts; colcothar (brown-red oxide of iron), 1 part. This preparation is one that can be cheaply made. It is recommended that it shall be, when thoroughly dried and mixed, put up in tight pastboard boxes holding about 5 pounds each, with a quick fuse in the side of the box—protruding 6 inches, with 4 inches inside—to facilitate and insure lighting it.

## Chimney Construction.

BY C. POWELL KARR, C. E., CONSULTING ARCHITECT.

(Continued from page 190, November issue.)

The specifications are comprised in the following remarks:

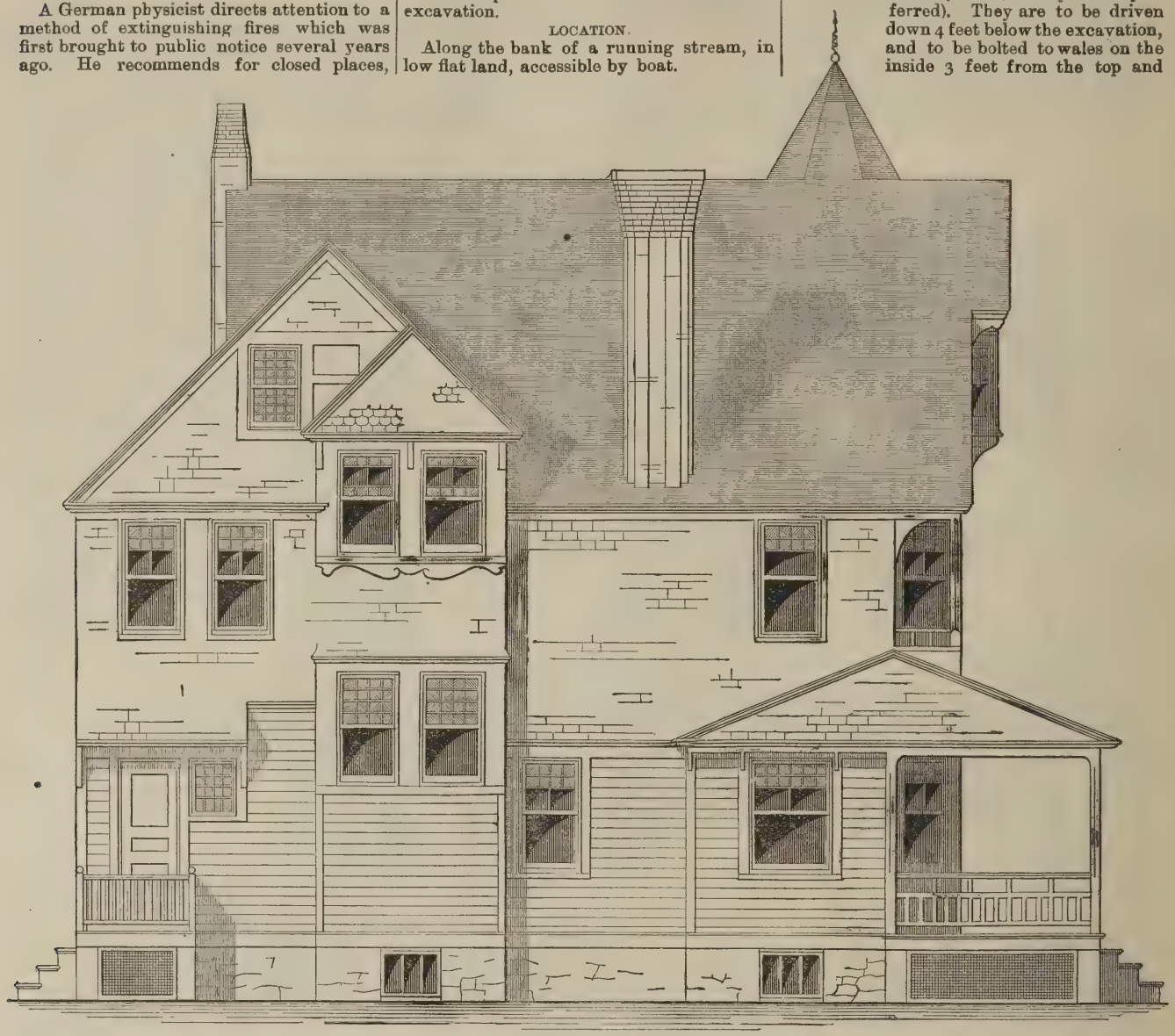
The drawings herewith submitted to form and be an essential part of these specifications, and, where they conflict with the language herein used, the architect or engineer in charge to interpret the true intent and meaning of the same, and his decision in writing shall be final and binding upon both parties to the agreement:

EXCAVATION.

To be, measuring from the natural surface, 12 feet in depth and 12 feet square, as it is supposed the soil to be of a soft and yielding nature, and what is known as "river bottom." Earth carried more than 100 feet to be paid for as so much additional excavation.

LOCATION.

Along the bank of a running stream, in low flat land, accessible by boat.



*Frame House, Side Elevation (Left).—Scale, ⅛ Inch to the Foot.*

FOUNDATION.

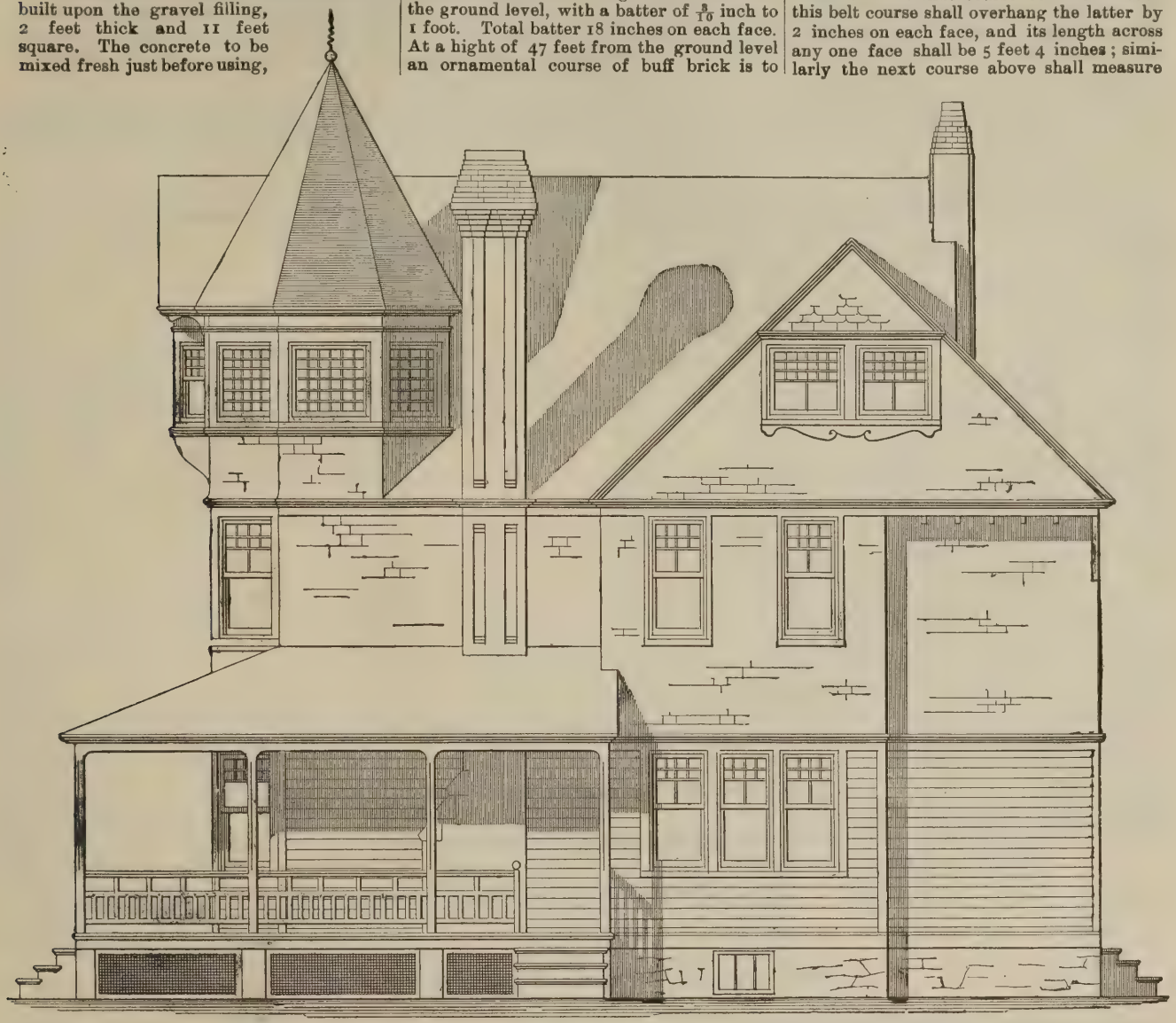
To consist of three sections: 1. Filling of gravel. 2. Concrete. 3. Brick substructure, all beneath the natural surface level. The entire excavation is to be inclosed and walled by sheet piling. These piles are merely to be mill stuff, 12 feet long, 3 inches thick and preferably 10 inches wide, to be of well-seasoned spruce (Pennsylvania preferred). They are to be driven down 4 feet below the excavation, and to be bolted to wales on the inside 3 feet from the top and 5 feet from the bottom, two bolts to each plank, one at the top and one at the bottom. The wales to be of sound seasoned oak, 3 inches wide by 2 inches thick.

*Foundation Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.*

1. *Filling.*—To consist of sharp clean gravel free from loam and rammed in layers of 6 inches in depth to a total depth of 4 feet.

The ramming to be done by a heavy maul.

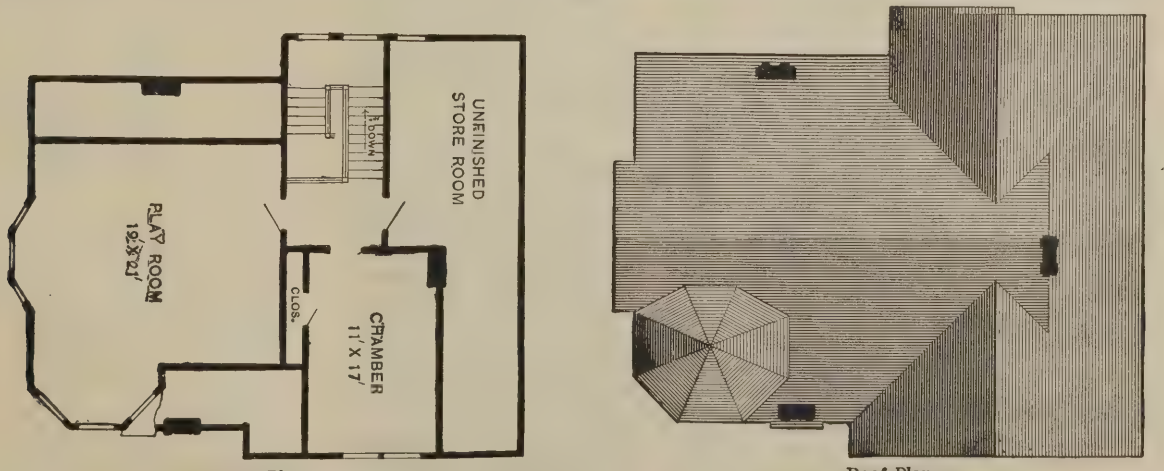
2. *Concrete.*—A footing of concrete to be built upon the gravel filling, 2 feet thick and 11 feet square. The concrete to be mixed fresh just before using, and to be built of well-selected North River hard-burned brick to a hight of 60 feet from the ground level, with a batter of $\frac{5}{10}$ inch to 1 foot. Total batter 18 inches on each face. At a hight of 47 feet from the ground level an ornamental course of buff brick is to be of similar buff special brick already described. The first course of brick above this belt course shall overhang the latter by 2 inches on each face, and its length across any one face shall be 5 feet 4 inches; similarly the next course above shall measure



*Frame House.—Side Elevation (Right).—Scale, ⅛ Inch to the Foot.*

to be deposited in layers of 6 inches in depth evenly distributed, well rammed and leveled up. The sides and edges vertical and true.

3. *Brick Substructure.*—To be built upon the concrete footing 8 feet square at the base and of a uniform cross section of 8 feet extend around the exterior faces of the chimney, said course to be of special brick 8 inches deep from the angular edge to the back, 3¾ inches wide and 1 foot in hight, as shown in the drawings. At a hight of 49 feet from the ground level another belt 5 feet 8 inches on each face, and the next course at its lower corners shall measure 6 feet, and for a rise of 13 courses shall batter to 1½ inches on each face to make the total width at the top of the thirteenth course 5 feet 9 inches; the next course shall recede




Attic Plan. Roof Plan.

*Scale, $\frac{1}{16}$ Inch to the Foot.*

square for 6 feet in hight where it should be level with the natural surface. The brick to be laid in hydraulic cement mortar consisting of 1 part of cement to 2 of sand. Good American cement will suffice.

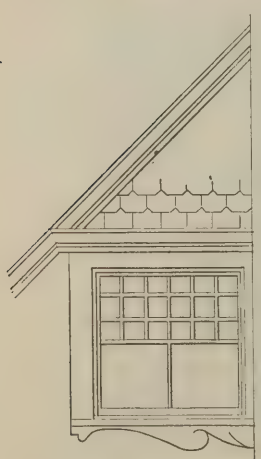
MAIN SHAFT OF CHIMNEY.

To rise from a square base 8 x 8 feet, course of ornamental buff special brick similar to the one just described shall be constructed, as shown in the drawings.

*The Chapter.*—At an elevation of 60 feet from the ground level an ornamental belt course shall encompass the exterior faces of the chimney of the same dimensions, and to or offset 2½ inches on the faces, total length 5 feet 4 inches; the next face shall recede 3 inches, and the next 3 inches, making their respective dimensions 4 feet 10 inches and 4 feet 4 inches, which brings us to the coping course; this shall be 6 inches in hight, and shall be of good blue-stone or

slate. In the four external faces of the chapter there shall be recesses, as shown in the drawings, to lighten the chimney top and to serve as an ornament; at a depth of 4½ inches from the face, beginning on the sixth course above the top of the last belt course, the recess shall begin and extend across the face 2 feet and to a hight of 1 foot, substantially as shown in the drawings. The brick that are used are to be rubbed or molded to correspond with the angular faces shown in the drawings.

*Doorways*—Shall be constructed at the bottom of the chimney, one for the admission of flues, one measuring 2 feet 6 inches by 5 feet, the other 2 feet 6 inches square for the admission of workmen to make repairs, substantially as shown in the drawings. Radius to equal width of doorway.



*Gable Finish (Right Side).—Scale, ¼ Inch to the Foot.*

*Pavement.* — The bottom of the chimney proper within the flue chamber to be paved with a good pavement either of stone 6 inches square, as indicated in the drawings, and 1 foot deep, laid in cement mortar or with good hard-burnt Jersey brick set on end, bedded and laid in cement mortar.

*Interior of Shaft or Flue Chamber.*—To consist of three divisions or sections and designated as top, middle and lower sections. Lower section in the form of a truncated pyramid having a square base 3 feet 9 inches square; upper base, 3 feet 3 inches square; altitude, 20 feet; slope, $1\frac{8}{10}$ inches to the foot; total slope, 3 inches.

*Middle Section (Interior)*—To be a truncated pyramid. Lower base, 3 feet 7½ inches square; upper base, 3 feet 1½ inches square; altitude, 20 feet; slope, $1\frac{8}{10}$ inches per foot, or total slope of 3 inches on each face. Offset at bottom on each face 2¼ inches.

*Top Section (Interior).*—To be a truncated pyramid. Lower base, 3 feet 3½ inches square; upper base, 2 feet 9 inches square; altitude, 20 feet; slope, $1\frac{5}{16}$ inches per foot, or total slope of 3¼ inches. Offset on lower edge, 1 inch on each face.

*Finial.—Scale, ½ Inch to the Foot.*

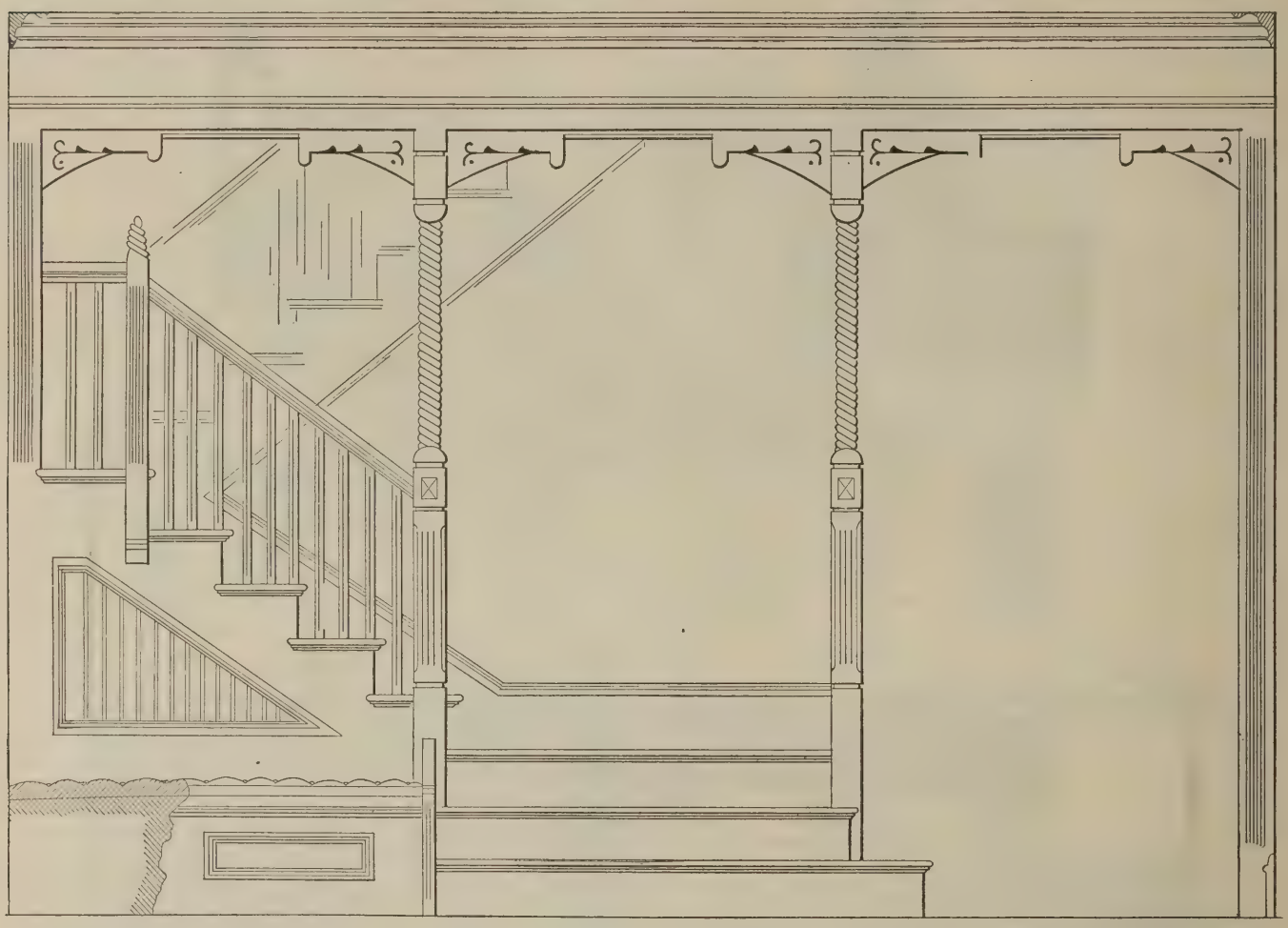
*Flue Outlet* — Which passes through the chapter. To be a rectangular prism, 2 feet 9 inches upper and lower base; altitude, 6 feet 6 inches. No slope, no offset.

*Ladder.*—The flue chamber to be provided with an iron ladder to the coping, the rungs to be of wrought iron, heavily galvanized, 1 foot in length and fastened securely in the masonry during construction, as shown in the drawings. The parts bedded in the masonry to be dipped in boiling tar and thoroughly sanded and laid in cement to prevent rusting.

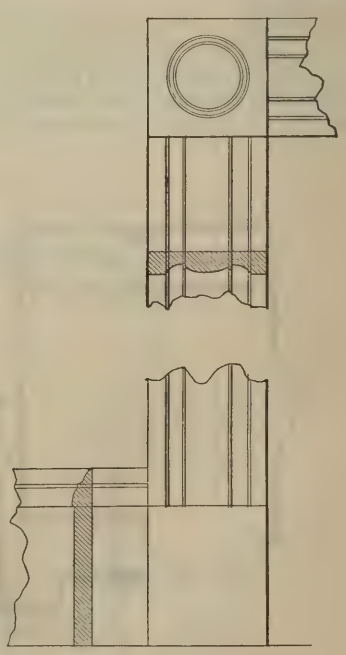
*Fire-brick Lining.*—The lower and middle sections to be lined with good fire-brick; thickness, 4½ inches, laid in fire-clay mortar, and the joints to be filled flat and flush with the faces of the walls, and each joint to be rubbed smooth with a flat "jointer."

BRICKWORK MASONRY.

All portions of the chimney shall be built in accordance with the plans and detail drawings accompanying these instructions. Selected North River brick to be used for external faces, and no unsound brick to be used in any part of the structure. All the bricks to be well wet, top, bottom and sides, before laying, and to be laid with solid joints well flushed up with mortar, as specified in section on materials. All voids in the brickwork, where not otherwise provided for, are to be filled up with bats or spawls of brick. All courses to be run perfectly level and straight. No grouting



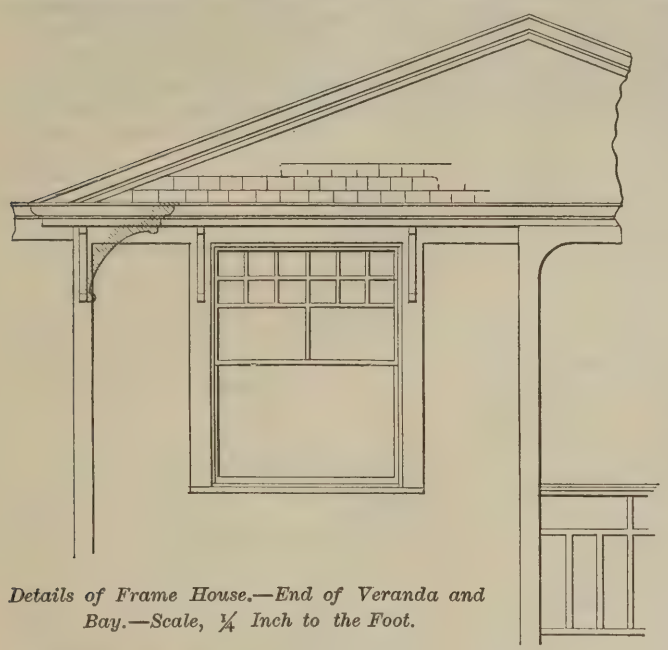
*Details of Frame House.—Hall.—Scale, ½ Inch to the Foot.*



*Finish in Dining-Room, Parlor and Hall.—Scale, 1½ Inches to the Foot.*

will be permitted in any part of the structure. Every tenth course a row of headers, with the exception of the chapter and the foundation courses, laid on the 3½-inch face of the brick. Every fourth course to rise no more than 10 inches, center to center of joint.

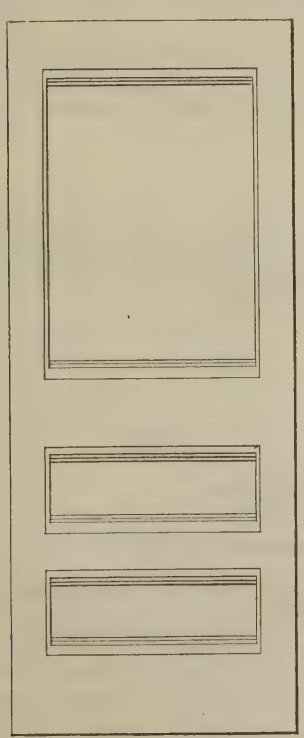
The batter of outside walls to be exactly $\frac{3}{10}$ inch to the foot of rise, from the ground line to the beginning of the ornamental belt course which belongs to the chapter, and great care should be exercised in preserving the uniformity of this batter, in



*Details of Frame House.—End of Veranda and Bay.—Scale, ¼ Inch to the Foot.*

order that the center of gravity of the chimney may not deviate from the vertical line passing through the center of magnitude. The interior batters and offsets are to be given in the reference table of dimensions.

The joints of the exterior walls above ground to be filled flush with the faces of the bricks when struck with the trowel, and



*Front Door.—Scale, ½ inch to the Foot.*

every joint, both horizontal and vertical, to be neatly and carefully rubbed smooth with a flat, not an S-shaped, jointer, so as to leave the faces of the walls perfectly smooth and flush. Interior joints, vertical and horizontal, to be laid with a fire clay paste and to be flat flush joints. This paste to be composed of fire-clay, ashes and just enough lime to work well, to be mixed dry, and water in a proper amount added afterward to make a stiff paste. The corners of the retreats or offsets to be rounded off with fire clay paste, as indicated in the drawings.

*Materials.*—All sand used in mortar or cement to be sharp, clean, gritty and free from loam, stones, salt and vegetable matter.

*Concrete.*—To consist of 1 part by measure of cement equal to best Rosendale cement, 2 parts of sand and 5 parts of broken stone or hard brick whose largest diameter will pass through a 2-inch ring. These materials must be free from dust or dirt, and must be made in a box or on a board floor, but in no case on the ground. They must be thoroughly mixed until every stone is covered with mortar. It must be deposited in layers not exceeding 6 inches in thickness and settled in its place by slightly ramming sufficiently to flush the water it contains to the surface, and thoroughly compacted.

*Brick.*—To be of the best quality whole sound selected North River, hard burned entirely through, and for exterior faces must be of a uniform color. All bricks are to be thoroughly dampened by immersion. Every brick to be laid in a full and close ¼-inch joint on its bed, ends and sides at one operation. No masonry shall be built on the concrete foundation until the latter has thoroughly set. All exterior joints in the substructure shall be neatly struck. Fire-brick to be of the grade known to the trade as No. 2's, 9 x 4½ x 2¼ inches, to be of uniform size and shape and sound in quality; compact in structure; not close, but rather coarse and gritty, so as to allow room for expansion, for such brick are more refractory than close brick. Must be free from stones, lumps and irregular large air cavities, and upon being struck with each other should emit a ringing sound.

*Mortar.*—To consist of 1 part by measure of good stone burnt slaked lime to 1 of sand, to 1 of bituminous coal, sifted ashes or crushed cinders. The ingredients must be thoroughly mixed on a board platform or in a box, and not on the ground.

*Cement Mortar.*—To consist of 1 part by measure of cement to 2 of sand, to be mixed dry and sufficient water afterward added to form a paste stiff enough to handle with a trowel. The mortar must be used as soon as it is mixed, and no mortar left over which has become set shall be tempered over or used in any way. It must be made in a box or on a floor, and not on the ground. Special brick to be buff colored and of the dimensions as shown in the drawings, hard burned, selected and sound, laid in cement mortar with joints neatly drawn or struck.

*Coping.*—On the chapter to be of one stone, dressed true on all sides but the bed, which will have a "joint surface"; thickness to be at least 6 inches, 4 feet four inches square, with an opening cut 2 feet 9 inches square, corresponding to the flue opening in the chimney; to be bedded in American cement mortar; the angles must be clean and the edges perfect; the top sides and all faces but the bed joint to be pean axed with a ⅞-inch jaw patent axe.

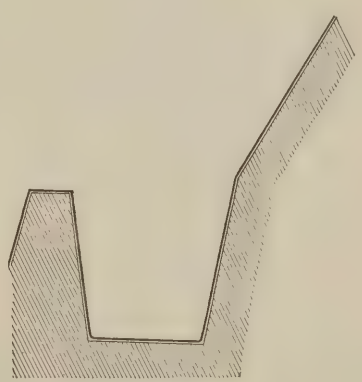
(To be continued.)

With diminishing timber supply, what a short time ago would have been considered very small points are now of the greatest importance in deciding what kind of machinery to use in timber reduction. In sawing inch lumber the $\frac{3}{16}$-inch saving effected by the band-saw, with its $\frac{3}{16}$-inch kerf, over the circular, with its $\frac{5}{16}$, is getting to be a very important item. For every 1000 feet cut by the circular the band would furnish 1187½ feet from the same log. According to an exchange, machines of the latter class are in the market which can be relied upon to do 40,000 feet per day.

## An Experience with Lead Gutters.

A correspondent of one of our German exchanges presents a very interesting account of his experience with lead gutters on a building in Frankfort-on-the-Main. The following is a translation of his communication:

The sheet-lead gutters were made by me according to the order of the architect between 1874 and 1876. The lead was required to have a thickness of 5 mm. and weigh 36 kg. per square meter. The lead rolls were 1.25 m. broad and from 4 to 5 m. long. I first laid the sheet lead flat upon the steep roof boarding and fastened it above with wire nails. I next clamped an edging-board upon the lead, so that the lead projected from underneath the board about 50 cm. The lead was then bent up throughout the entire length of the board; this was taken off, the nails were drawn out, and the bent-up lead let down into the wooden gutter. I next took a piece of hardwood, 1 m. long, which, after deducting the thickness of the lead, fitted exactly into the wooden gutter. This piece of wood was then laid upon the lead in the gutter and driven in with a sledge-hammer, which caused the lead to assume the shape of the interior of the wooden gutter. This was an easy job and was succeeded by bending down on the face. For accomplishing this bending down I used special mallets made for the purpose. The front side of the gutter was covered in with slate, placed underneath the bending. I did not fasten the lead on the front of the gutter,



*Experience with Lead Gutters.—Form of Gutter Employed.*

as its own weight would keep the bending down. The upper back edge of the gutter was simply nailed with wire nails upon the roof boarding at first, but I soon ascertained that the weight of the lead caused it to slide down upon the boarding. To remedy this, therefore, I drove in plumbers' hooks with broad heads, at a distance of 6 cm. apart, and in addition to this I drove in nails with larger round heads, placing them from 7 to 8 cm. apart. All the seams, which were about 3 cm. broad, were first scraped very clean, and I then soldered them, using a large quantity of solder and smoothing the seams with a hammer handle dipped in oil.

These gutters remained in good working order for five or six years, after which small cracks began to make their appearance, and required soldering. After the time of guarantee—four years—had elapsed I was engaged by the year to keep the gutters in order, being obliged to inspect them every six weeks. I then learned to my sorrow that lead gutters were not by any means as serviceable as zinc gutters. In winter, when the lead is cold, the gutter does not change, but as soon as spring opens, when the sun begins to heat the lead, it

commences to work and opens into cracks. It is still worse in summer, when the sun vents its full force on it throughout the entire day. Then the lead becomes so heated that it will burn your hand. The heat of the sun on hot days causes the lead to rise in single places sometimes as high as 5 or 6 cm., and the cool nights cause it to contract. This continuous working causes the lead to tear and crack, the edges of the cracks sometimes opening as much as from 5 to 8 mm. throughout the entire breadth as far as it lies upon the roof boarding. These cracks generally open near the seams. Not a single seam of the gutters has opened, but the cracks are always at a distance of from 8 to 10 cm. away from them. The gutters on the north side, where there is less exposure to the rays of the sun, have hitherto kept in good order. If I was called upon to make the gutters over again I would not lay them upon the roof boarding, but would make them by themselves, and make the roofing independent of the gutters.

## Wood-Working Course in Sibley College.

A very interesting pamphlet has been issued by Prof. R. H. Thurston, director of Sibley College, Cornell University, Ithaca, N. Y., descriptive of the Schools of Mechanic Arts belonging to that institution. In addition to the regular undergraduate course of instruction given in Sibley College to students desiring to enter the profession of mechanical engineers there are several special courses for students in various departments, as in marine engineering, steam engineering and in the mechanical engineering of railways. There is also a course of special instruction in the mechanic arts intended for those special and optional students who possess a talent for using tools, and who may have a desire to fit themselves for becoming foremen, superintendents or managers of establishments, and who therefore require special instruction. The course is also intended for students going to the university with the intention of entering the regular course in mechanical engineering who have unusual talent in manipulation and a bent toward shopwork, and who find themselves better fitted for this course than for the other, or who, while developing unusual ability in the practical operations of the course, find the theoretical work of the advanced part of the course in mechanical engineering unsuited to their plans of future work. The courses of instruction in the mechanic arts begin with one year, usually, of instruction in wood-working, including the use of tools, the ordinary operations of carpentry and joinery, and, where the student proposes to enter the machine shop or foundry, in pattern-making. The second year includes, ordinarily, foundry-work and blacksmithing. For students in the art of carpentry and joinery the latter course is pursued, but only up to the point at which tool dressing is taught. Those intending to study pattern-making take the course in the foundry in addition to tool dressing. Machinists and iron and brass workers of any kind take the whole course. The third year is devoted by those studying the art of metal-working to work in the machine shop, and by the wood-workers to their own department, except that the pattern-makers work a sufficient length of time in metal to make them understand something of the bearing of their work on the methods of designing patterns. The fourth year is given to instruction in that branch of mechanic arts to which the student proposes to devote himself after his work at the college is finished.

Accompanying these courses of instruction in the college shops is a course of study in the various departments of the college and the university which is intended to give such knowledge in the sciences, literature and art as will best suit the demands of such students. The course of instruction in drawing begins with freehand drawing, which occupies two terms, and is succeeded by machine sketching, mechanical drawing and designing, and is accompanied by a course of very thorough instruction in descriptive geometry. These various lines of work give the student a knowledge of the theory and valuable practice in the art of drawing, and continue throughout the whole course. The concluding part of the work consists in making designs of such constructions as are to be made by the student in

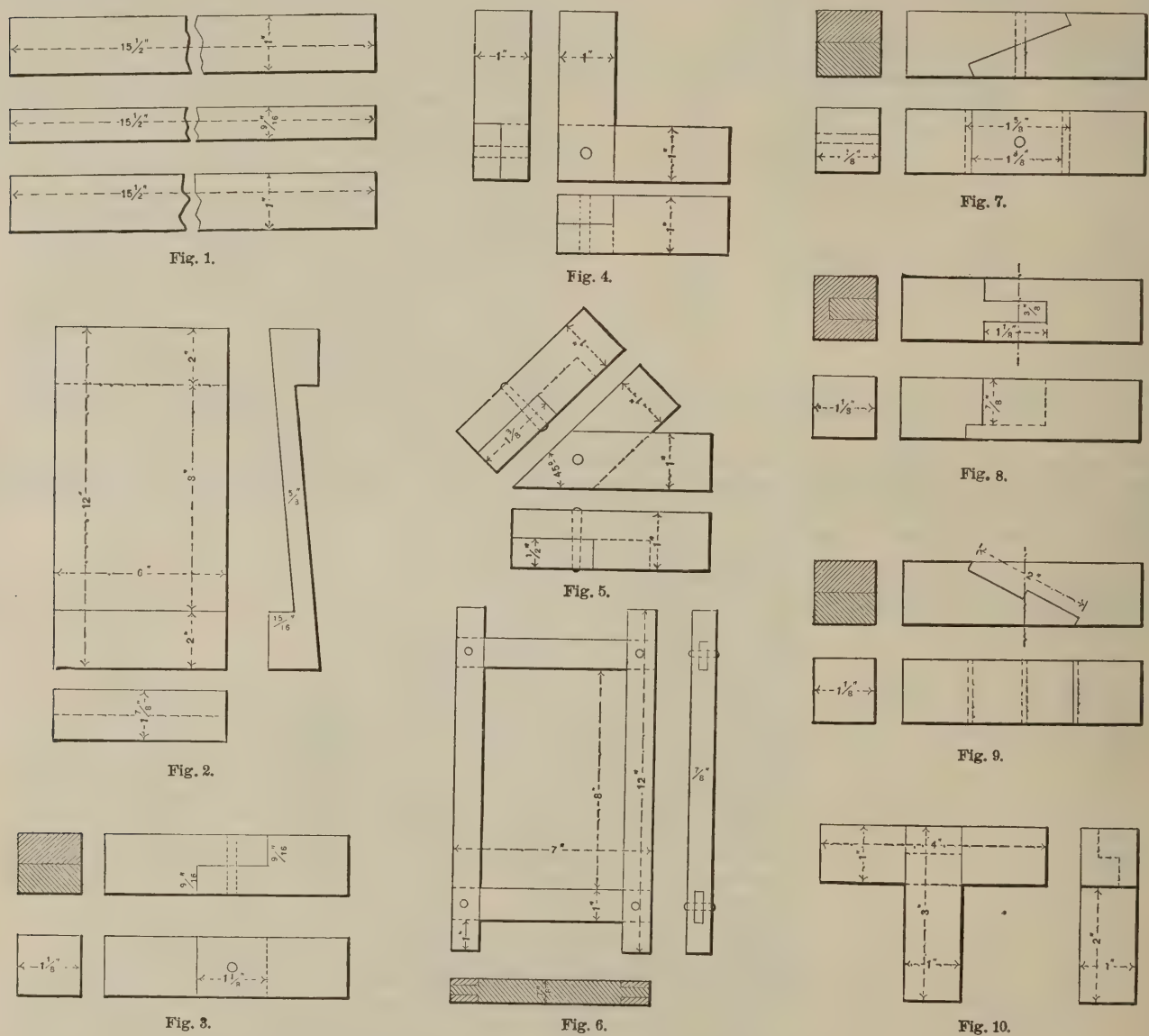


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5. Fig. 6. Fig. 7. Fig. 8. Fig. 9. Fig. 10.

*Wood-Working Course in Sibley College.—Exercises from the Course in Wood-Working.*

The question of how to prevent checking in the ends of timber when it is being seasoned is engaging the attention of English engineers. According to a recent report it has been ascertained after trying a number of expedients that by painting the ends of the timber with thick glue several kinds of lumber can be dried without checks. It is supposed that the glue penetrates far enough to cement the layers of the wood together near the ends, and thus keep the ends from drying faster than the rest of the wood. Of course this method requires seasoning under cover, since rain would have the effect of dissolving the glue.

the practice of his profession. Students in the art of the mechanician are given work in designing machinery. Students in the art of carpentry and joinery are advised to take as much of the course in architecture as time and opportunity may permit, including its work in the drawing room.

The course in carpentry and joinery has a time schedule of 60 hours and is confined to the first term of the first year. The following is the schedule :

USE OF TOOLS.

1. *Hammer.*—Striking equidistant and square blows; nail and set; nail on line; flush blind, and toe-nailing.

2. *Planes.*—Grind, sharpen and set. Given a piece of pine, 12 inches x 6 inches x 2 inches, to surface out of wind; take to width and thickness and then square with the block-plane.

3. *Saws.*—To file and set; cross-cut and rip saws. Cross-cut to pencil and knife line; rip to line on

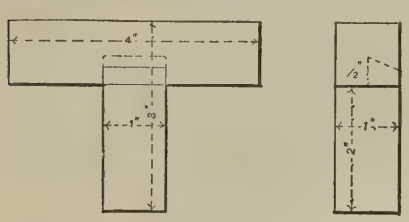


Fig. 11.

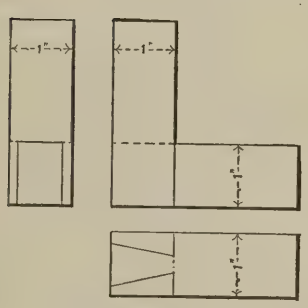


Fig. 12.

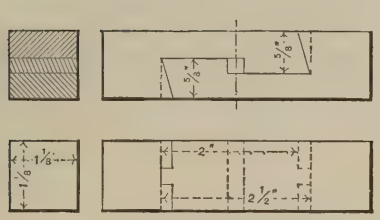


Fig. 13.

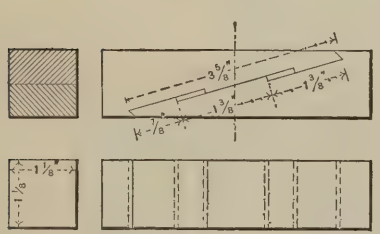


Fig. 14.

of exercises connected with the wood-working course. They form the beginning of the course, and lead on into the special courses in carpentry, joinery and cabinet-making; the work here given is what would usually be termed the "manual training course," and is intended to give the student a good knowledge of the use of tools and a certain amount of expertness in handling them, which is essential to satisfactory performance of advanced work in construction. It is the application of what is sometimes incorrectly called the "Russian system"—a system original, probably, in this country—to elementary trade instruction. When a student has accomplished the work here illustrated to the satisfaction of himself and his instructors he is prepared to take up any

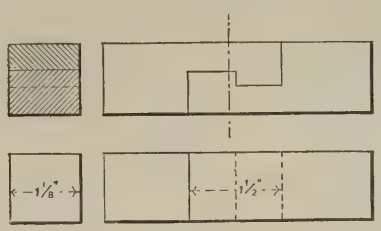


Fig. 15.

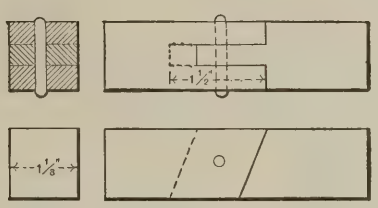


Fig. 16.

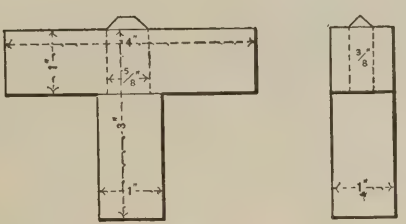


Fig. 17.

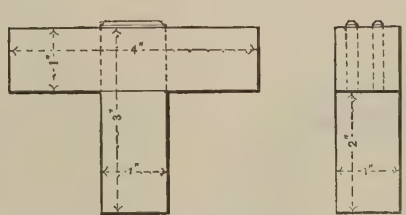


Fig. 18.

on boards cut nicely to size and sent into the woodshop. The students in the wood-working shop make the boards on which the blue prints are mounted. In a similar manner the students in the wood-working shop make the patterns for use in the foundry, and the templates and other bits of woodwork needed in the machine shop, while those working on the course in molding make all castings needed for the other shops and for the university. The students in the blacksmith shop make all forgings, and make and temper all toools used in the machine shop as well as the tools of the forge; the machine shop supplies work in the construction of all machinery not requiring special machine tools or made by specialists in the market, The latter departments have made steam engines,

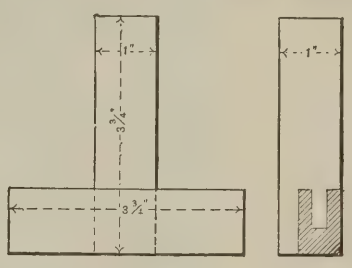


Fig. 19.

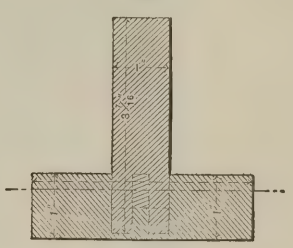


Fig. 20.

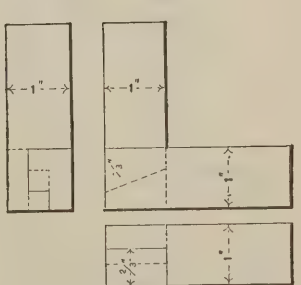


Fig. 21.

*Wood Working Course in Sibley College.—Exercises from the Course in Wood-Working.*

the above piece of pine, (exercise 2); forming bench hook for joinery exercises.

4. *Chalk Line.*—Learn to use; saw to chalk line.

5. *Gauge.*—Learn to use with left hand as well as right.

6. *Try Square.*—Learn to use, making winding sticks.

7. *Bevel.*—Learn to use, making saw clamps and chamfers.

8. *Chisels.*—Grind and sharpen; pare, chamfer and mortise.

APPLICATION.

*Exercises* 1, 2, 3.—Joints; straight, corner and angular.

*Exercises* 4, 5, 6.—Mortise and tenon; square, angular and blind.

*Exercises* 7, 8, 9.—Gains; straight, butt and angular.

*Exercises* 10, 11, 12.—Splice; bevel, square and key.

*Exercises* 13, 14, 15, 16.—Dovetails; "T," corner, common and blind.

*Exercises* 17, 18, 19, 20.—Dovetails; plain, frame, box and miter.

*Reference Books.*—"Carpentry and Joinery," Tredgold. "Workshop Appliances," Shelley.

Our illustrations represent a sample line work that may be placed in his hands involving the use of the tools required in the performance of these exercises, and to make from a drawing any structure combining these devices or any similar details. It is seen that the student first takes up the use of the plane, and then of the saw, then of the chisel, and so on, until he is familiar with and knows how to use well all of the common wood-working tools. The exercises lead from the simplest constructions on and up to the most difficult, first at the bench and then at the lathe.

In the work of the Sibley College schools it is indeavored to make the several departments assist each other as much as possible, and to get all work done by the students rather than by the instructors. Students in the drawing-rooms make these drawings for the wood-workers, trace them and blue print then. The prints are then mounted on boards cut nicely to size and sent into the woodshop. The students in the wood-working shop make the boards on which the blue prints are mounted. In a similar manner the students in the wood-working shop make the patterns for use in the foundry, and the templates and other bits of woodwork needed in the machine shop, while those working on the course in molding make all castings needed for the other shops and for the university. The students in the blacksmith shop make all forgings, and make and temper all toools used in the machine shop as well as the tools of the forge; the machine shop supplies work in the construction of all machinery not requiring special machine tools or made by specialists in the market, The latter departments have made steam engines, lathes, face-plates and straight-edges, and have kept up and increased its own stock of twist drills, reamers and other tools. The shops are devoted to instruction rather than construction, but some work is done for the market when it can be made a means of both instruction and profit.

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Mr. Edward Atkinson, in speaking about floor construction and the danger of dry-rot, wrote a short time since as follows: "It is gratifying to observe that what is now known as 'the mill floor'—to wit, heavy beams set wide apart, covered with solid plank—is being introduced into many city buildings. I have observed in one or two cases a cause of danger where this method has been adopted which is easily avoided, and which should be very carefully avoided. I examined a building recently in which all the beams have been varnished. This may

be fatal to the stability of the building. If the pores are stopped by an ordinary paint or varnish, what is known as "dry-rot" may and probably will occur, to the total destruction of the beam within three years. I have had such a case in a factory under my own administration, and I know by bitter experience what the danger is where the seasoning of these timbers is prevented by putting a water-proof covering of any kind on the outside."

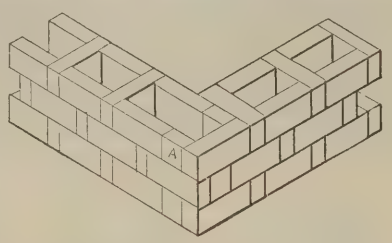
## Leasing an Unhealthy House.

A very interesting case recently came up in an English court. An owner let to a tenant a house in an unsanitary condition. Shortly after the tenant had taken the house several members of his family were seized with an illness through, as it is alleged, the escape of sewer gas, and the illness proved fatal to his wife. He claimed damages for the expenses he had incurred in medical attendance and removal, and also for the loss of his wife, at whose death an income of £800 per annum ceased, and the trial ended in favor of the plaintiff, with a verdict of £2240. An appeal was had and the verdict set aside, and the case goes to the Court of Appeals. What the final decision will be we can scarcely venture to predict. The *Sanitary World*, a high English authority, in discussing the case, says: "A person about to take a house is not in a position to know much, if anything, as to the state of the drains. On the other hand, the landlord does, or should, and we take it to be his duty to see that they are properly trapped and in good order, and should certainly ascertain this before letting his house, and if he fails in this respect we certainly think he ought to be held responsible for any ill-effects his tenants may suffer through his negligence." If, however, the Court of Appeals decides for the defendant, then, the same writer continues, it will "behoove every one who is about taking a house to have it properly surveyed before committing himself by signing an agreement even for a yearly tenancy, or to have a clause inserted in the deed that the drainage of the premises is in perfect order, which possibly would be the better way, as defects in drains are not found out at once. It is possible that the landlord will object to putting a clause of this kind in. We know that it is an unusual one, but that is no reason why it should not be made a usual one, which it would be as well to adopt at once, for even if the plaintiff does appeal we should have to wait a very long time for the decision, and in the meantime houses will have to be taken; therefore, to make sure and save after expense, we should advise our readers to follow the course we suggest. If the drainage is all right, surely no owner would object to say so and have it put in black and white; if he objects to this very reasonable request his house would be better to remain empty."

## Hollow Bonds.

BY ARTUS.

The annexed sketches show a very good system of building cheap brick walls, which answers well for cottages, farmhouses and small structures where great strength is not required.




*Hollow Bonds. — Fig. 1.— "Silverlock's" Hollow Bond.*

Fig. 1 shows what is known as "Silverlock's" hollow bond, and consists of the bricks being laid all on edge alternately headers and stretchers in every course. Supposing the bricks to be of the most common size, viz., 8 x 4 x 2½ inches, a 6-inch closer will be required at the quoin, as shown, marked A. "Dearne's" hollow bond, is shown in Fig. 2, and consists of the first course of bricks being laid headers, flat in the ordinary manner, and the next course stretchers on edge, the courses alternating up the wall.

By laying the bricks in either of these bonds a saving is effected of rather more than one-fifth of the total quantity of bricks required in a solid wall. If the materials are of good quality the brickwork will be amply strong enough for the purposes named, and considerably stronger and more durable than would be produced at the same cost by the use of a solid wall of inferior materials.

## Experiments on Foreign Woods.

An important conference on "Colonial Timber," in conjunction with the Colonial and Indian Exhibition, was recently held at Chelsea, England. The object of the meeting, says one of the English papers, was to undertake a series of experiments on different varieties of colonial timbers, which were at present commercially unknown in the English market, but to the peculiar qualities and advantages of which it was desirable to draw attention. On no previous occasion has such an opportunity been offered for operating on so varied a collection of colonial timbers, and the importance of the trials was sufficient to excite more than usual interest. Various samples were converted by special machinery into such descriptions of work as the colonial experts present deemed them most suitable for About 40 samples of wood were selected for experiments, and a number of different operations were successfully carried out on them, such as tree-felling, cross-cutting, sawing, planing, straight and irregular molding, mortising, and tenoning, besides which several articles were made completely, such as casks and barrels, doors, hammer and pick handles, carriage spokes, railway sleepers, &c. The samples operated on embraced woods from New South Wales, Victoria, South Australia, Western Australia, New Zealand, Canada, Cape of Good Hope, British North Borneo and India. The woods were of every description, from the hardest iron bark to the soft mild working Douglas fir of Canada; in all cases the samples left the machines with the same smooth finish, the only difference being that the harder qualities of wood were passed through the machine at a somewhat slower rate. Perhaps the most important experiment made was the manufacturing of tight casks for spirit, &c., from such of the colonial woods as were suitable for the purpose. Nine machines worked alternately by one lad were employed, of which four sufficed for the body of the cask, three for the preparation of the heads, and two for making the hoops. Although the casks, being made of different woods, presented a varied apearance they were all alike in point of finish and solidity. At the close of the experiments, which lasted about two hours, a short conference was held, when Mr. Ransome was able to state that, among the 40 different species operated upon, some stood out as pre-eminently suitable for the English market, instancing the iron bark and mountain ash from New South Wales as well suited for

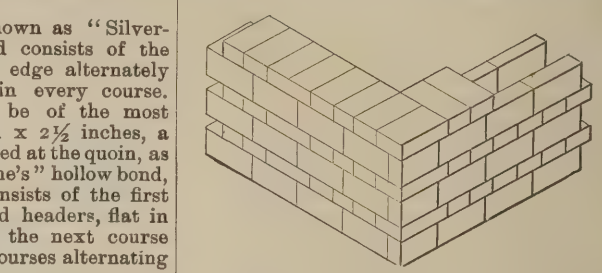
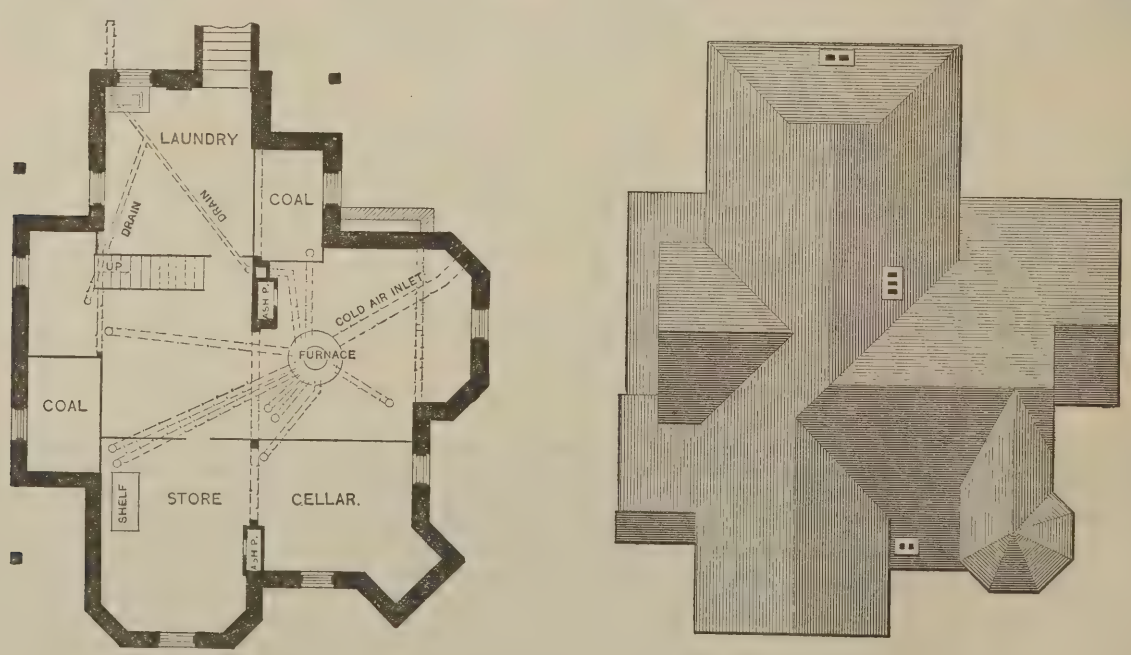
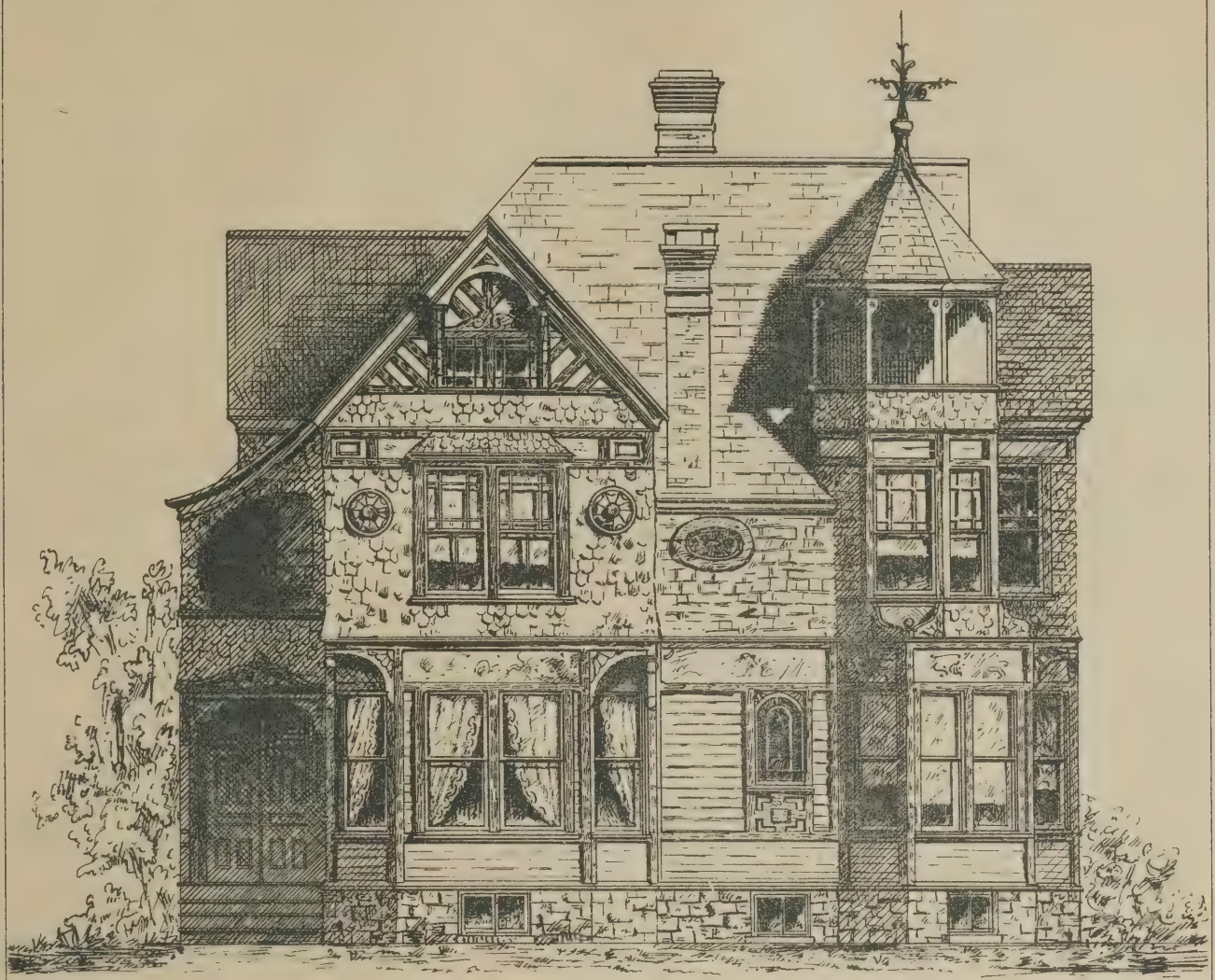


*Fig. 2.—"Dearne's" Hollow Bond.*



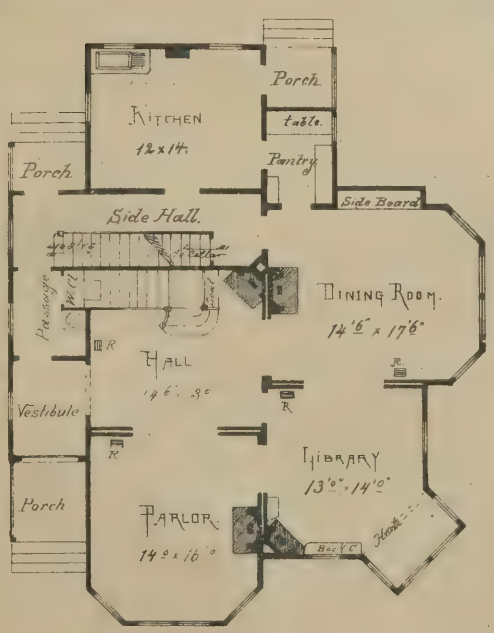

*Foundation and Roof Plan of House Designed by John L. Wees.—Scale, $\frac{1}{16}$ Inch to the Foot.*

PLATE XLV.

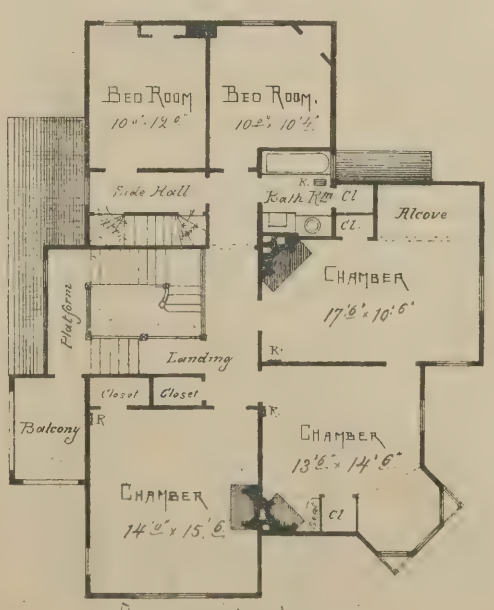


## HOUSE DESIGN BY JOHN L. WEES, ST. LOUIS, MO.

FRONT ELEVATION. – Scale ⅛ Inch to the Foot.



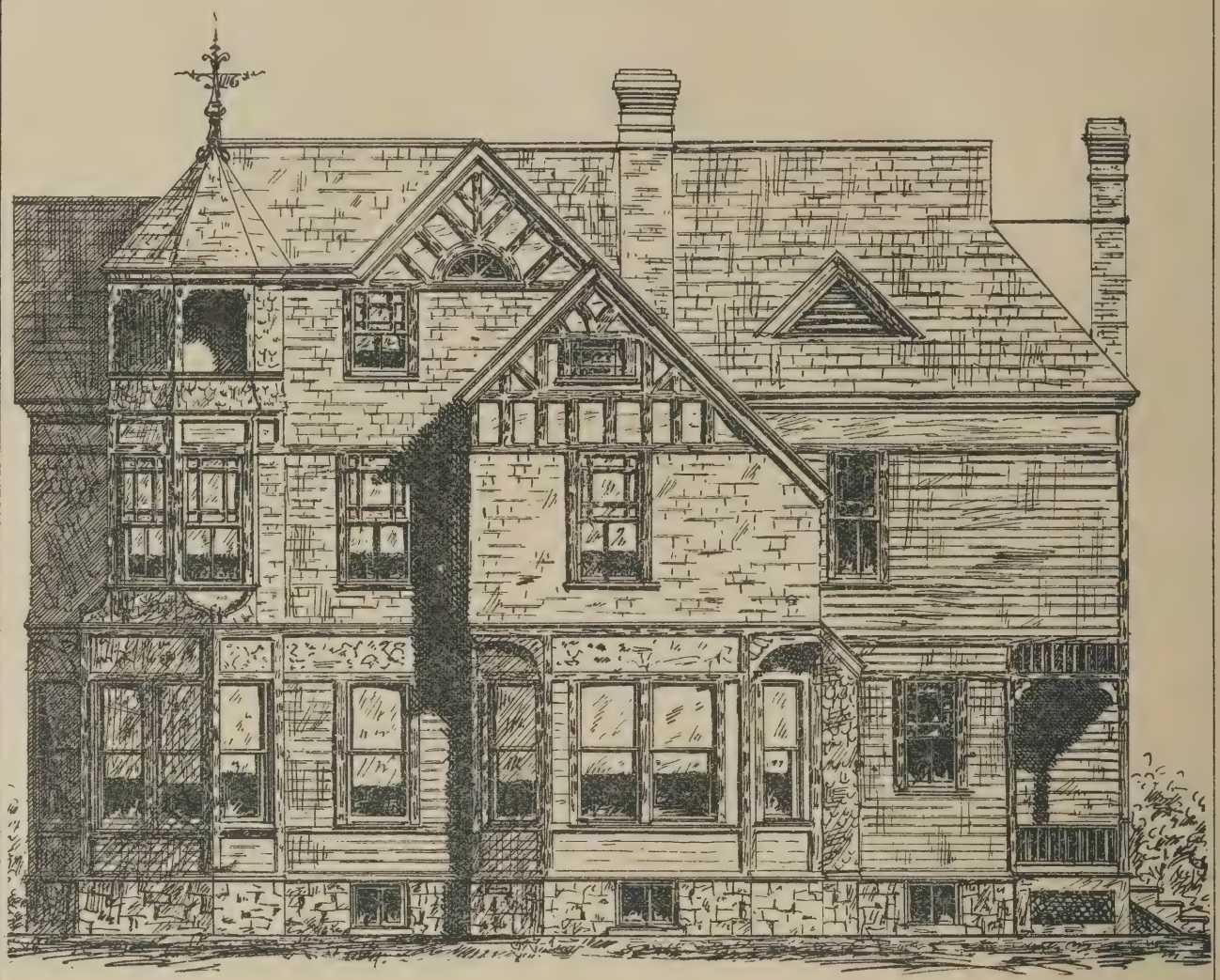

First Floor Plan.




Second Floor Plan.

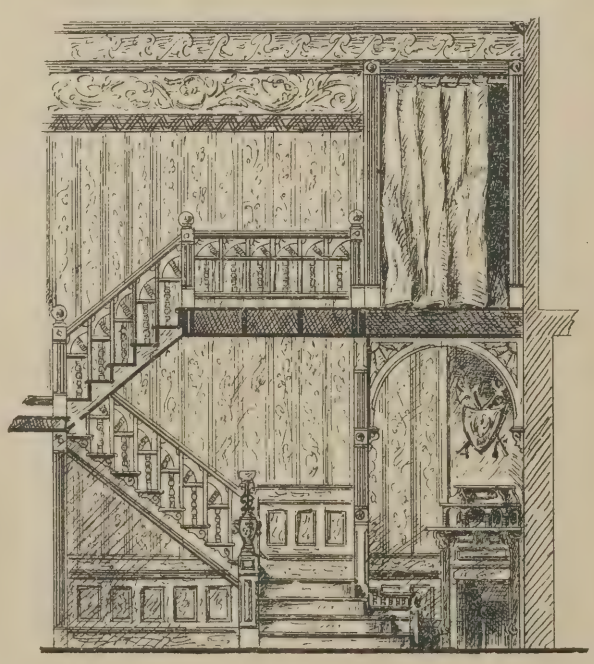
FLOOR PLANS. – Scale 1/16 Inch to the Foot.

PLATE XLVI.

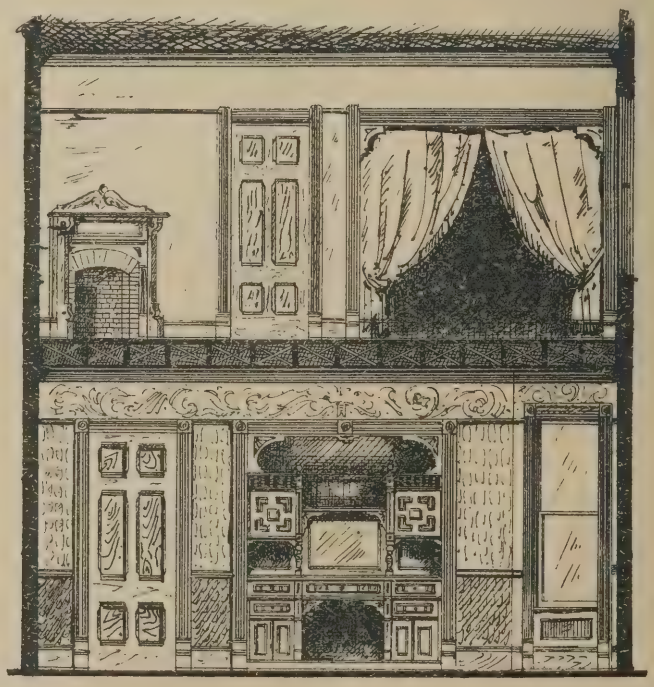


## HOUSE DESIGN BY JOHN L. WEES,

SIDE ELEVATION, [RIGHT.] Scale ⅛ Inch to the Foot.



SECTION THROUGH HALLS.
Scale ½ Inch to the Foot.



SECTION THROUGH
DINING ROOM AND CHAMBER.

PLATE XLVII.

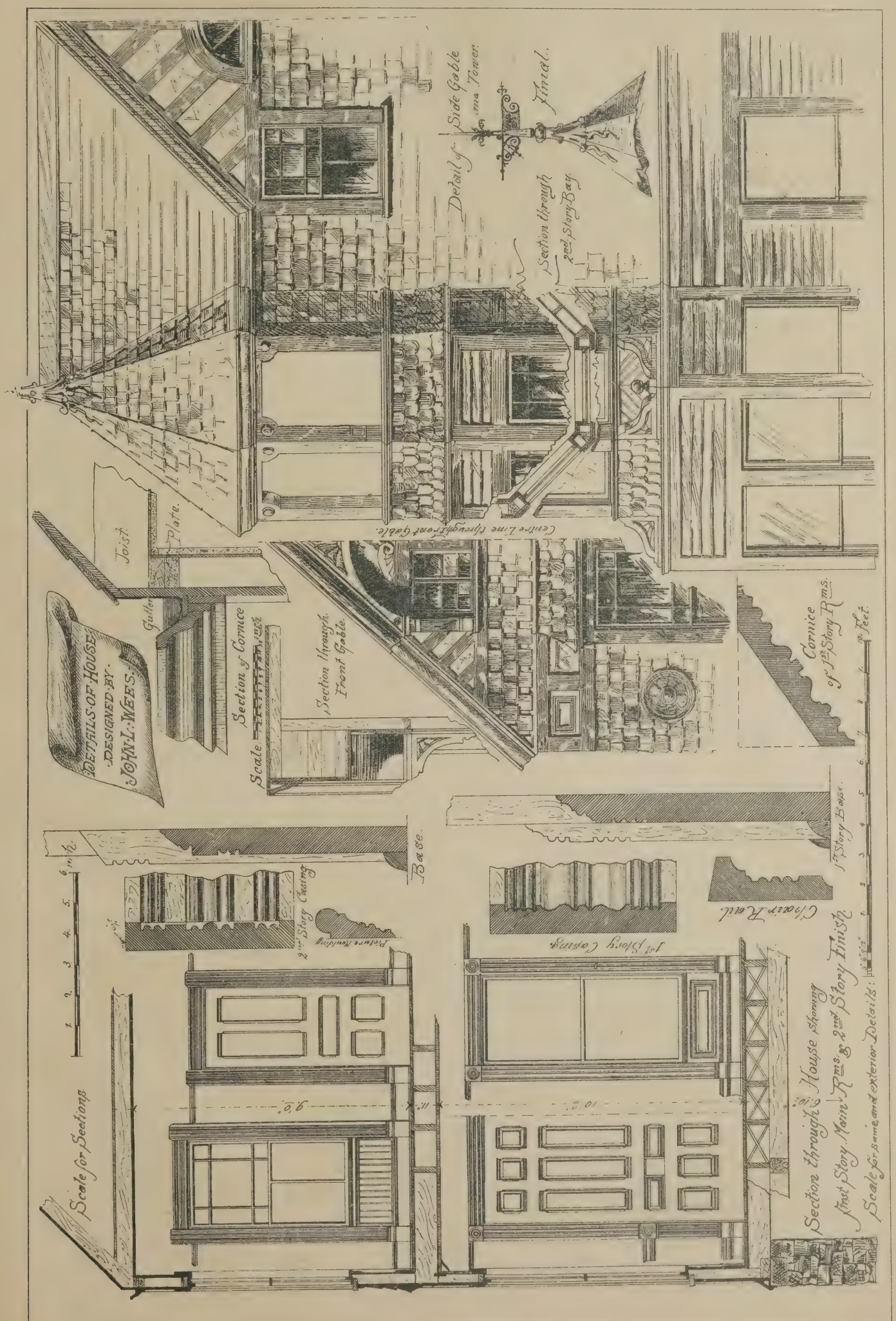
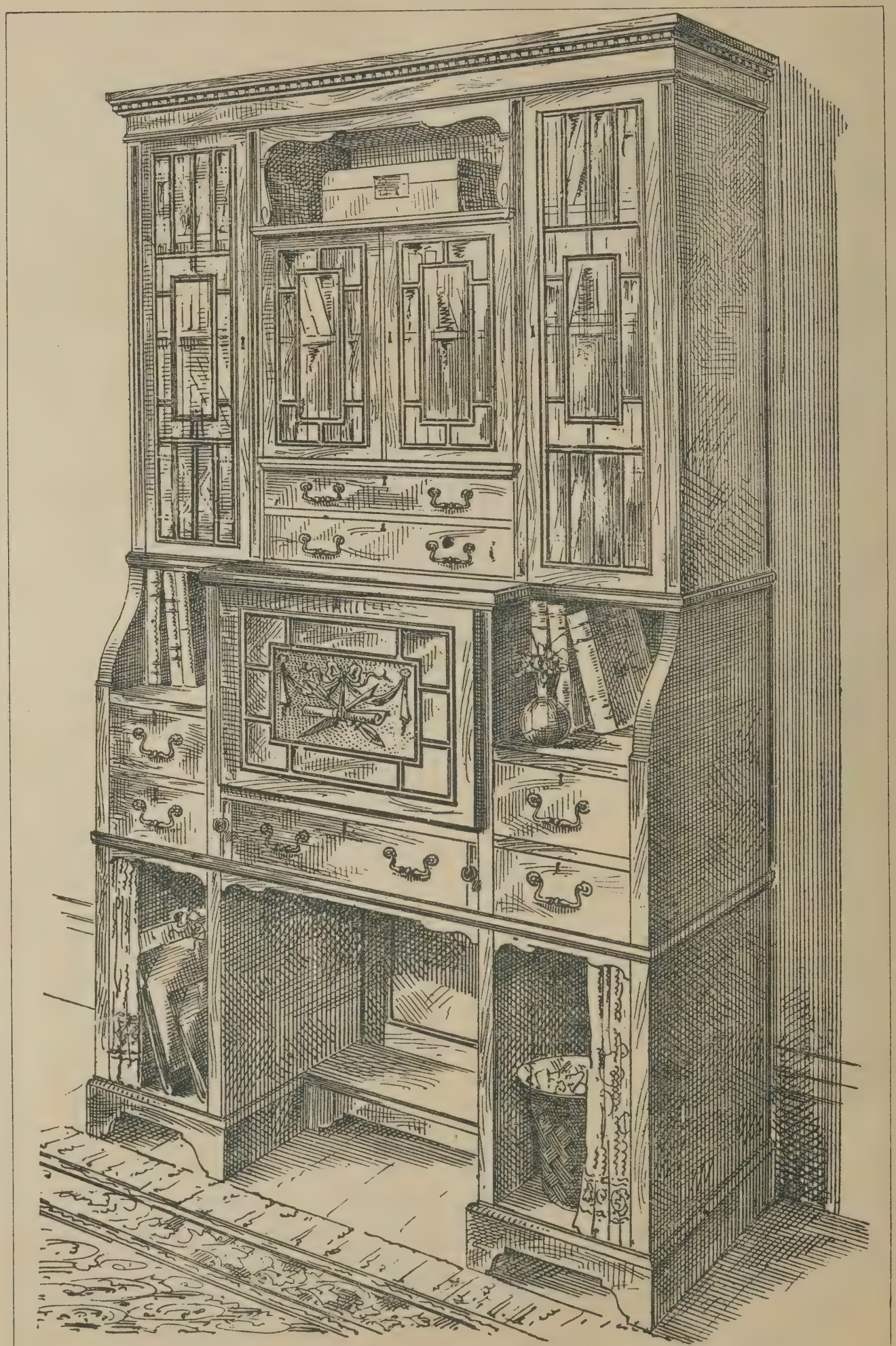

DETAILS OF HOUSE
DESIGNED BY
JOHN L. WEES.
Section of Cornice
Scale
Joist
Plate
Gutter
Section through Front Gable
Detail of Side Gable and Tower
Finial
Section through 2nd Story Bay
Centre Line through Front Gable
Cornice of 1st Story Rms.
Feet
1st Story Base
Chair Rail
Base
2nd Story Casing
Picture Moulding
1st Story Casing
Scale for Sections
Section through House showing
first Story Main & Rms. & 2nd Story Finish
Scale for same and exterior Details:

PLATE XLVIII.



SUGGESTION FOR A SECRETARY BOOKCASE.

wheelwright work, piles, and railway sleepers. The black wood from Victoria would be found well suited for cabinet work; karri wood and jarrah from Western Australia were both useful for joiner's work, furniture, sleepers and piles. The New Zealand woods were well adapted for furniture, house building and general purposes, kauri being especially useful. The Canadian woods, such as the Douglas fir and swamp ash, were suitable for building purposes. The sneeze wood from the Cape, owing to its unusual durability, was well adapted for piles, posts, telegraph poles, &c., and the tellon wood was like lancewood and made excellent doors. The billian and sarayah woods from North Borneo, were very useful woods. The padouk wood from India was well suited for carriage building, furniture, &c. It was very plentiful and grew near the coast. Unfortunately many of the samples of wood sent from several of the colonies were too small for experiment, but as far as quality was concerned they were suited for a variety of purposes.

## The Prevention of Roof Fires.

We take the following about the construction of roofs so as to prevent fires from a pamphlet entitled "The Prevention of Fire," recently issued by William Paul Gerhard, of New York:

The construction of the roof should be such as to make it at once water-proof and fire-proof. If the asylum or hospital stands in a row, which location it is well to avoid if at all possible, parapet walls must be carried to a sufficient hight above the roof to prevent the spread of fire from a neighboring house. To protect the roof against sparks it should be covered with some incombustible material. Shingle roofs should be avoided, especially in built-up neighborhoods. Slate, copper, tin, tar and gravel and asphalt make good roof coverings. Roofing tiles of terra-cotta are also excellent, although they are seldom used in this country. This may partly be due to the fact that experience with them in cold climates, such as that of Massachusetts, has pointed out the fact that they soon go to pieces. According to Mr. Atkinson slate should not be used unless laid over mortar. A flat plank roof is much to be preferred. On a pitched roof in the country he advises to use shingles laid over mortar as better than slate laid in the ordinary manner. Any turret, skylight, ventilating shaft or dormer above the roof should be carefully protected by slates, tiles, metal or other incombustible material. It is obviously far preferable to have a detached building standing on a large lot, with free open space surrounding it on all sides. No matter how well constructed and protected internally, a building in a row is always greatly exposed to dangers threatening from without. In the case of a roof covered with tin special precautions should be observed when repairs are being made to prevent a fire caused by carelessness in handling the soldering furnace.

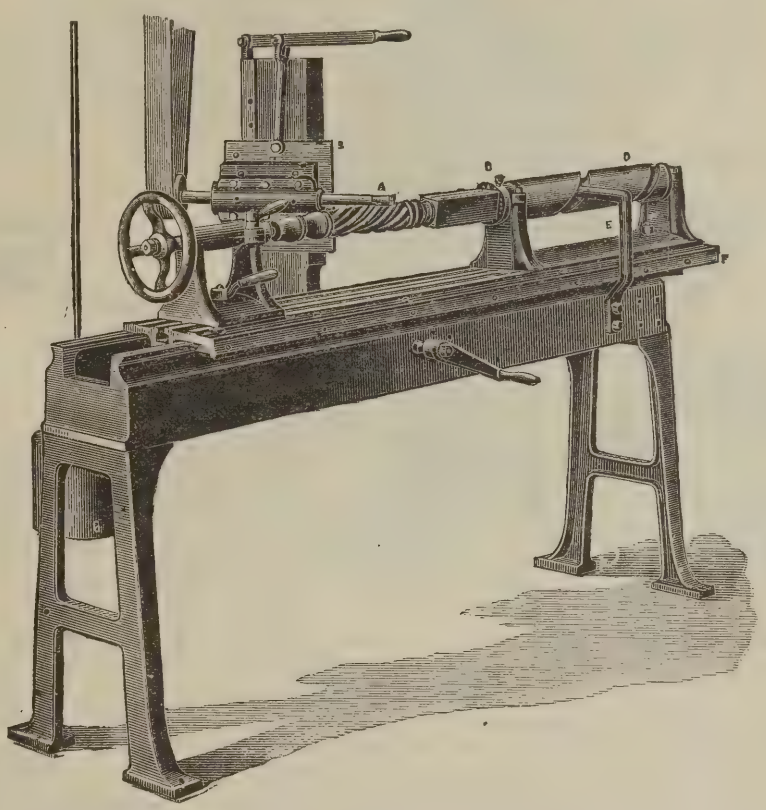
## Impregnated vs. Natural Samples of Wood.

In the Excerpt Minutes of the "Proceedings" of the British Institution of Civil Engineers we find results of a series of interesting experiments made in Germany a short time ago with impregnated and natural samples of wood. The object of the experiments was to ascertain the relative effect on impregnated and natural pine wood samples of various treatment, corresponding as nearly as possible to that to which wood paving is subjected. The investigations were directed to the following points: 1. The effect of acids, urine and liquid horse-dung on impregnated samples. 2. The effect of atmospheric influences on the same. 3. The hydraulic absorption of impregnated and natural samples. 4. Expansion in consequence of absorption. 5. Resistance to bending of impregnated and natural samples. 6. Resistance to compression of impregnated and natural samples, The acids used were hydrochloric, sulphuric, nitric and phosphoric, all with a strength of 10 per cent. The impregnated samples, after subjection for 14 days to the various substances named, were found, on careful examination with a microscope, to be unaffected by them. Atmospheric influences were artificially produced. The samples were, *a*, slowly heated in water to boiling point, kept for some time at this temperature, and then suddenly cooled by plunging into cold water; *b* boiled half an hour in a 15 per cent. solution of salt and frequently cooled suddenly during this time; *c* boiled half an hour in a 5 per cent. potash solution; *d* boiled half an hour in the same solution, with an addition of 1 per cent. sulphide of ammonia; *e* boiled half an hour in a solution containing 2 per cent. sulphate of iron, 2 per cent. sulphate of copper, and 10 per cent. of common salt. The samples were not injuriously affected by this treatment. Impregnated samples of wood absorbed much less water than those in a natural condition. The increase in volume in consequence of the absorption of water was less in the impregnated than in the natural samples. The tests on the bending strength of the samples showed that those impregnated were stronger by about 15 per cent. than the others. The resistance to compression of the impregnated samples was greater by about 22 per cent. than that of the natural samples. Before testing for absorption all the samples were thoroughly dried. The method of impregnation, at the request of the manufacturers, is not described.

# NOVELTIES.

### Machine for Fluting, Carving and Rope Twist Cutting.

In Fig. 1 of the engravings we illustrate a machine that is being put upon the market by Engelmann & Co., No. 5 Morris street, West Walnut Hills, Cincinnati, Ohio,




*Novelties.—Fig. 1.—Machine for Fluting, Carving and Rope Twist Cutting.*

that is of peculiar interest to stair-builders, cabinet manufacturers and all who have any occasion to flute, carve or cut in imitation of rope-work any of the material which they use. The machine, it will be seen, is constructed on the principle of a turning lathe, and is provided with centers and a movable tailstock to hold the work to be cut in position. The cutter spindle A moving in the slide-rest B can be raised or lowered by the hand lever provided for the purpose, as shown, and will thus accommodate any diameter of column as well as follow the decrease in the diameter of taper columns as the cut proceeds toward the smaller end. In order to prevent the bit from cutting deeper into the wood than is desired a collar is placed on each side of the bit of the proper diameter, so adjusted as to run on the surface of the column. The slide-rest is balanced by the weight G, which is attached to swinging and oscillat-

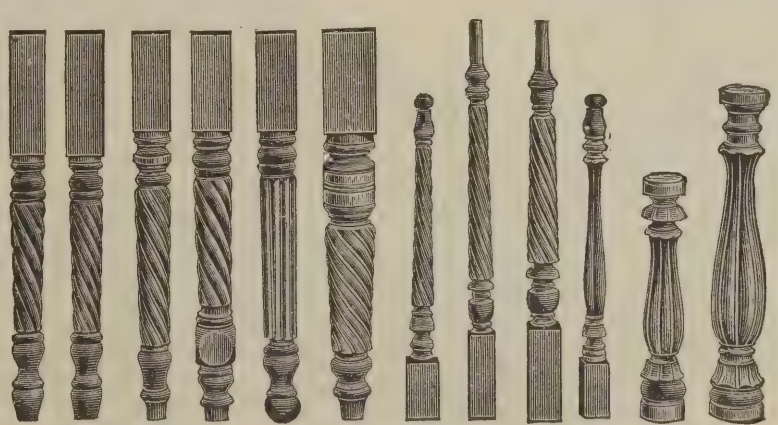
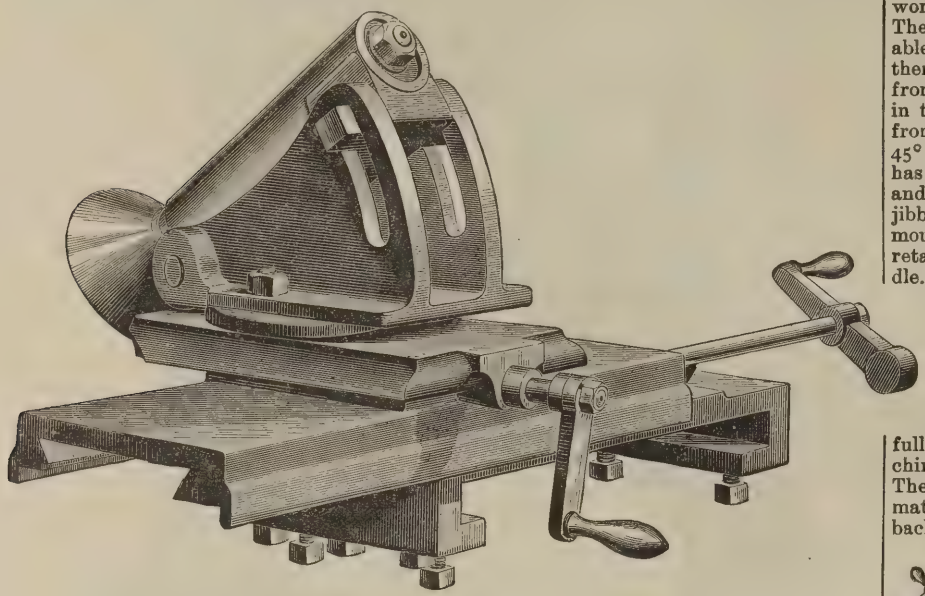


*Fig. 2.—Specimens of the Work Produced by the Machine Shown Above.*

ing hangers containing the pulleys, thereby retaining the proper tension on the belts at all times, and following the shape of the columns by a slight pressure on the lever, thus also rendering any adjustment of the belts unnecessary in order to provide for the different diameters of the work to be produced. The slide-rest sets in a circular extension with a slot on the back of the bed, so that the rest itself can be adjusted at any angle necessary to cut the required twists. A division plate, C, is used to regulate the number of twists or flutes to be cut on the columns. This part can be furnished with a groove of shorter or longer pitch, thus making the twists on columns either shorter or longer, as may be desired. Where straight carving or fluting is desired the guide E is removed from the roller, thus permitting the column to remain stationary. The slide-rest being attached to the bed remains stationary, and the carriage is then propelled backward and forward by the crank handle which is connected with a pinion working in a reciprocating rack attached to the bottom of the carriage. In Fig 2 are represented some samples of the work produced by this machine, from which will be gained an idea of the large variety that it is capable of producing. The machine is made in two sizes, one having a carriage 6 feet in length and a roller 2 feet long, thus adapting it for columns of 3 feet and under, and the other with a carriage 8 feet long, with rollers 3 feet long, and adapted for work 4 feet in length.



*Novelties.—Fig. 3.—Perspective View of Grindstone Truing Machine.*

### Machine for Turning and Truing Grindstones.

The truing of a grindstone is usually a disagreeable operation which is often neglected. The machine which we illustrate in Figs. 3 and 4, and which is built by London, Berry & Orton (Atlantic Works), of Philadelphia, will therefore be found a welcome means of going through this operation. The stone is not bruised off, but is cut by a chilled disk driven by the motion of the stone itself. The machine can be attached to any grindstone frame, and should be placed as shown in Fig. 4, with the axis A B of the cutter pointing toward the center line of the stone. The cut should be started in from each edge of the stone, meeting in the middle of the face of the stone, and will thus prevent breaking down the edges of the stone. The stone is run in water while being cut, avoiding all dust, and the whole operation occupies from five to fifteen minutes. The chilled disks are very durable, and can be renewed at very little expense.

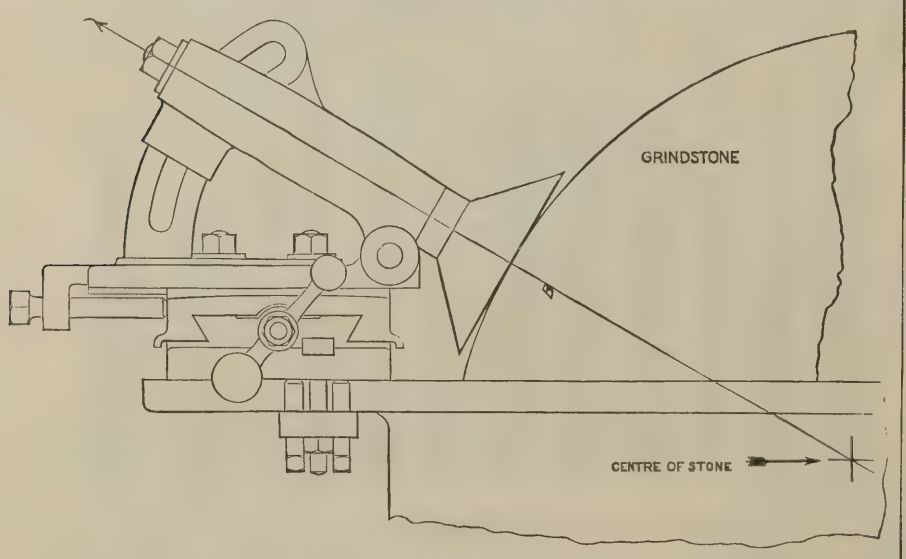



*Fig. 4.—Showing the Correct Position of the Cutter in the Grindstone Truing Machine.*

### Double Horizontal Boring Machine.

The machine in Fig. 5 of the illustrations has been perfected by Frank H. Clement, No. 131 Mill street, Rochester, N. Y. It is offered to the trade by the maker as being finely designed and carefully made. It is intended for that class of work in which two holes are to be bored at the same time—as, for example, doweling, chairwork, cabinetwork, carwork and other similar cases. The two spindles are mounted in an adjustable head which swivels around one of them, so that they may be set at an angle from the horizontal line of the table, as shown in the cut. The range of adjustment is from the horizontal to a perpendicular and to 45° beyond the perpendicular. The table has a vertical movement on jibbed ways and a forward and back movement also on jibbed ways. The intermediate gear is mounted on a radius arm, so that it always retains an even mesh with the central spindle. By slacking a nut the gear may be thrown out of mesh with both spindles, so that a single spindle may be used at any time without running the gearing. The frame is cast in one piece and is strong and well proportioned. The spindles are of steel, and the bearings, the maker informs us, are carefully scraped and fitted, so that the machine will start off cool from the first. The gear and pinions are carefully cut and matched together, so that they run without backlash or rattle. In giving directions for setting up this machine the maker says the counter-shaft is preferably located directly above the machine, so as to equalize the wear on the boxes.

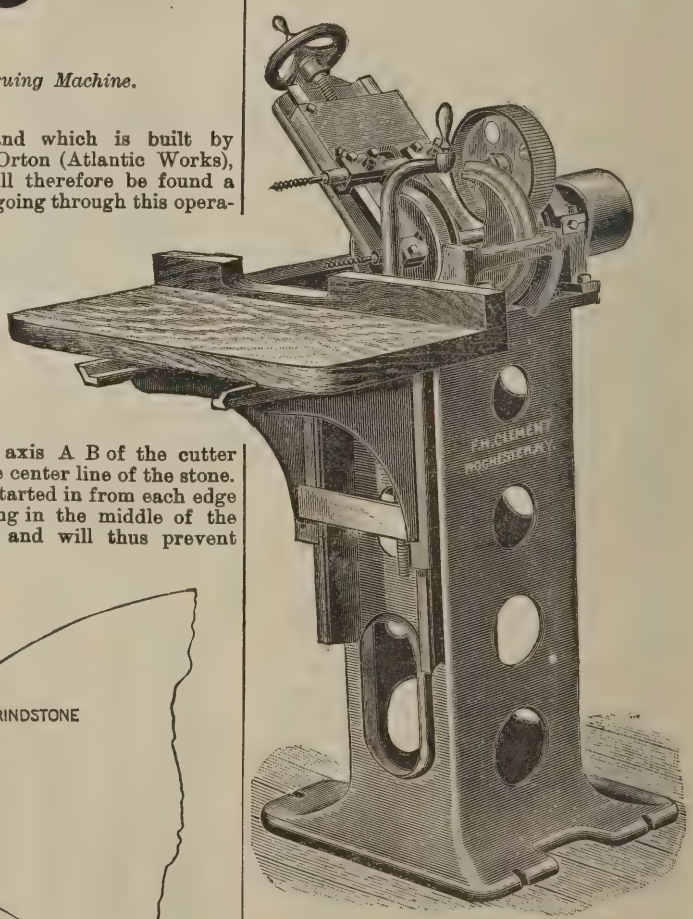
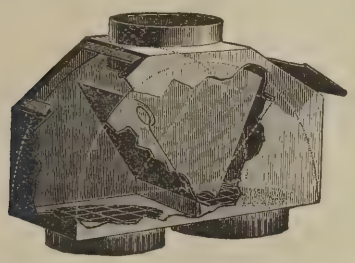


*Fig. 5 —Double Horizontal Boring Machine.*

### The Get-at-Able Cut-Off.

The accompanying illustration, Fig. 6, represents a cistern cut off that is being manufactured by the Henderson & Harker Mfg. Company, of Columbus, Ohio. On account of its features it has been called the Get-at-Able Cut-off. This name is due to the means which have been provided for getting at the interior of the cut-off for the purpose of removing obstacles, or for thawing out in winter. The top of the pipe leading to the cistern is

provided with a screen for the purpose of preventing sticks, leaves, bugs, &c., from entering the cistern. Of course with this there would be a certain accumulation of dirt inside of the cut-off. To remove this the device is provided with openings with slide doors by which access to the interior is had. In the winter time, in the event of the cut-off being rendered inefficient by freezing, the door can be opened and hot water poured through from a tea-kettle for the purpose of thawing out the pipe. The wire gratings used over the outlets for preventing substances from entering the cistern can be as fine or as coarse as best suits



*Novelties.—Fig. 6.—The Get at-Able Cistern Cut-Off.*

the owner of the house upon which the cut-off is employed. The special feature in the construction of this device is that the valve is so adjusted that it is entirely free and independent of the casing. It is moved from one position to the other easily and without strain or friction. The force of the water holds the valve in position, and all the water passes through the outlet for which it is set. We understand that these goods are made of the best grades of charcoal tin plates with special machinery, and that they are finished in a first-class manner in all respects.

### Double Head Panel Raiser.

In Fig. 7 of the illustrations we show an improved double head panel raiser recently brought out by the Egan Company, and door factories. As a panel raiser it is complete with self-feed for raising panels on both sides in a very complete and perfect style. It also is adapted for making all kinds of blind slats, sticking sash and door stiles, light moldings, &c. The mandrels carry two angle cutter-heads for paneling, so arranged as to give a shearing cut to the knife, thereby doing the smoothest kind of work on all kinds of wood. The mandrel frames are provided with a side adjustment vided with an adjustment at the back end to give any desired lead to the feed rolls. The bed is raised and lowered by the hand-wheel in front, and is provided with an improved pressure foot and long spring, also an extra fence for long panels. Access to the lower head is obtained by lifting off the end of the bed, which part is also adjustable to regulate the depth of the cut. As to the capacity of the machine, the makers state that it will raise panels up to 3 inches on both sides, and by a change of heads wider panels and all kinds of sticking can be done to advantage. The machine is recommended by the makers both as a double panel raiser and a double head sticker.

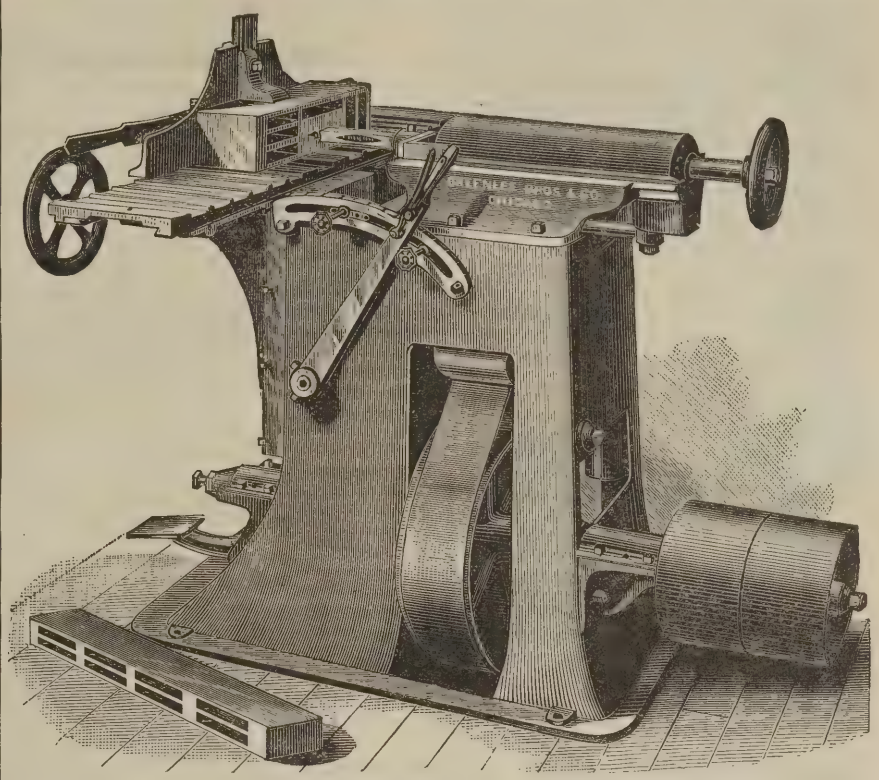
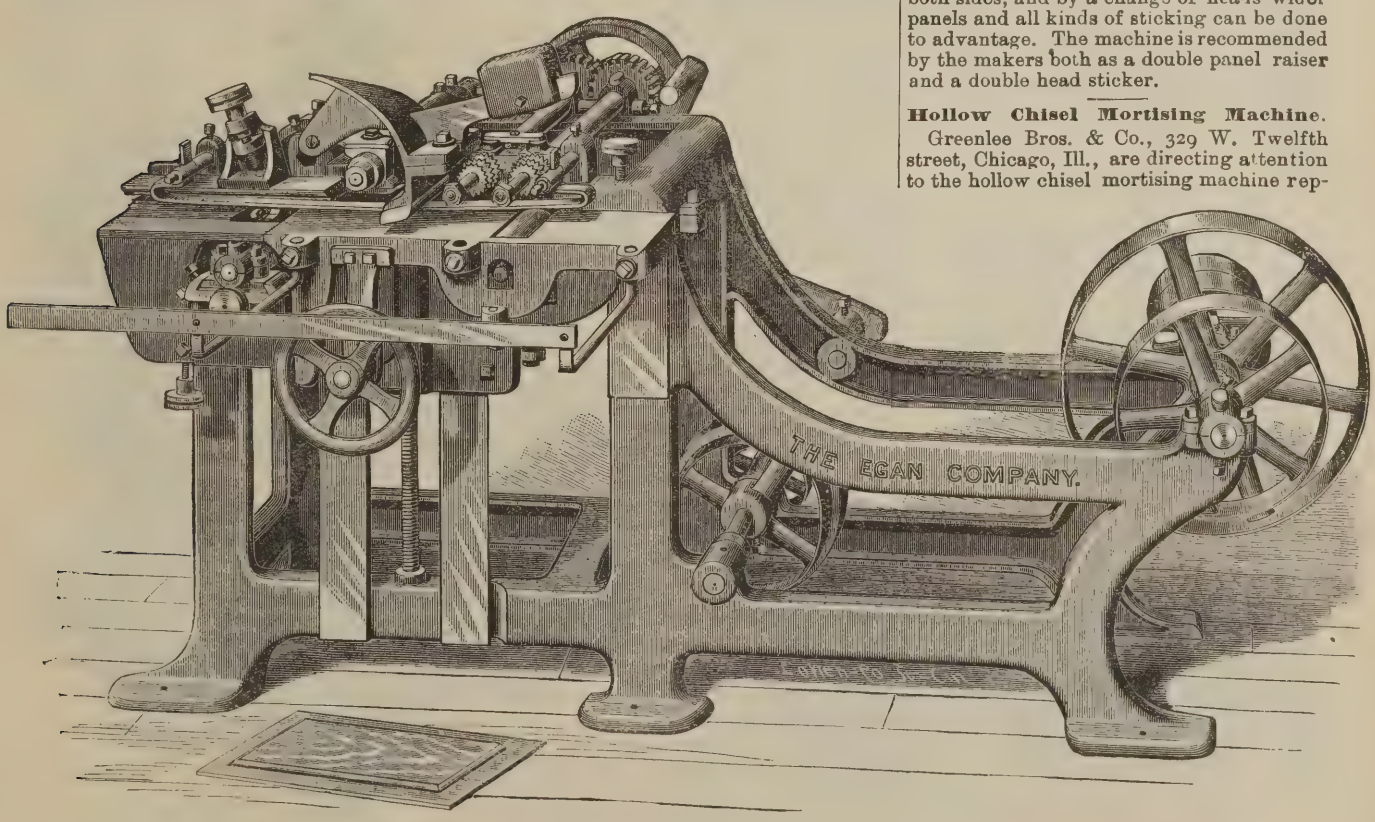


*Fig. 8.—Hollow Chisel Mortising Machine.*

### Hollow Chisel Mortising Machine.

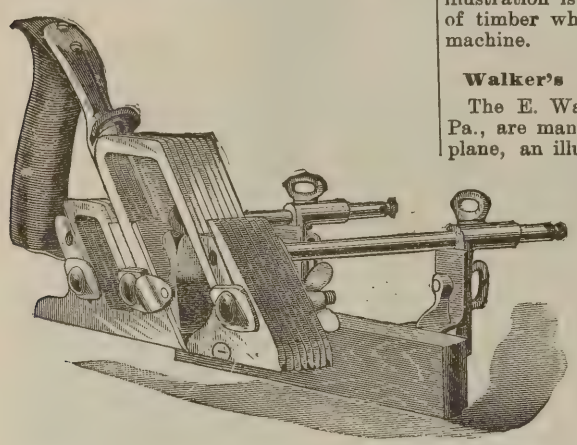
Greenlee Bros. & Co., 329 W. Twelfth street, Chicago, Ill., are directing attention to the hollow chisel mortising machine rep-




*Novelties.—Fig. 7.—Double Head Panel Raiser and Sticker Combined.*

Nos. 221 to 241 West Front street, Cincinnati, Ohio. From the catalogue of the makers we gain the following: The machine is a double head panel raiser and sticker combined, and accordingly it is a very desirable and useful machine in sash screw, a very convenient arrangement which will be appreciated by practical millmen. There are two feed rolls to the machine, set close to the front pressure-bar and held down by a spring, regulated by a hand-wheel convenient to the operator, and presented in Fig. 8 of the engravings. The process embodied in this machine is said to be entirely original in its application, the machine accomplishing a result in no other way attainable. The work is performed by a hollow chisel, the bit working inside,

while in turn the bit prevents the chisel from splitting or slivering the wood outside the mortised space. The machine is said to work with great facility in hardwood as well as soft. It is regularly and uniformly operated by means of stops and lever appliances. The finished mortise can be made in the time ordinarily required in laying out the work. The levers, as will be seen by reference to the engraving, are in handy reach. A single movement in each case, the makers assure us, is sufficient to throw the table in position or to raise or lower the cutting-bed of the machine. The depth of cut and the distance between mortises, perpendicularly or horizontally, are made uniform and are regulated at will by means of



*Novelties.—Fig. 9.—Walker's Adjustable Face Plane.*

stops and other effective mechanism. Mortises can be cut very closely together, even to the extent of leaving a wall of wafer-like thinness as a partition. This wall is not subject to the slightest strain or disturbance, a result to which the manufacturers allude as something not hitherto ob-

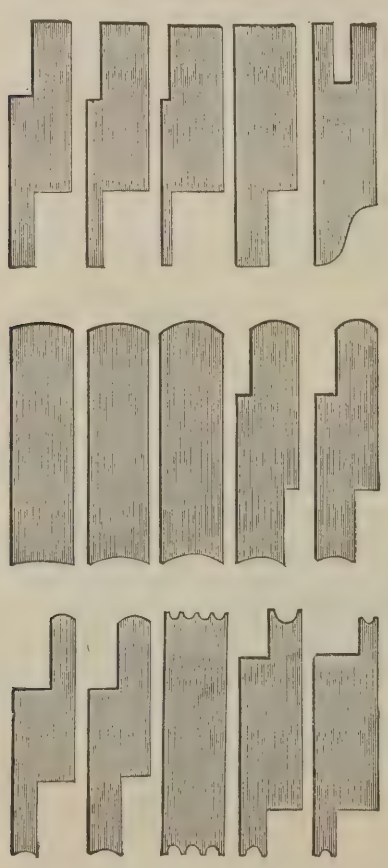


*Fig. 10.—Bits Furnished with Walker's Adjustable Face Plane.*

tained. The mechanism is so simplified as to require but little attention on the part of the operator, and it reduces his labor to a minimum. There is no downward or pounding motion to jar or strain the machine or to try the muscle or nerves of the operator, who is usually compelled to bear the brunt of the blow with his foot on the treadle. The movement in this case is direct and forward. The machine, as may be gained from the illustration, is substantially built. It will mortise 1¼ inches square and under to the smallest size required and to any desired depth. In the foreground in the illustration is the representation of a piece of timber which has been mortised by the machine.

### Walker's Adjustable Face Plane.

The E. Walker Tool Company, of Erie, Pa., are manufacturing an adjustable face plane, an illustration of which appears in Fig. 9 of the engravings. This plane is designed to take the place of the endless variety of planes very generally found among the kits of carpenters, including such as plows, dadoes, rabbets, fillet-ster, side bead, center bead, reeding, cove, quarter-round, nosing, sash, table, Roman and various styles of ogee, hollow and round and different forms of molding planes. By reference to the engraving it will be seen that the face is composed of eight plates, so fastened together and held that they may be adjusted to any shape desired according to the bit that is to be employed in the plane. In order to adjust the face to any requirement the thumb-nut bolts clearly shown in Fig. 9 are loosened. The bit is then put in place, and the plates, which have their edges rounded, are adjusted even with the bit. The nuts are tightened and the plane is then in condition for use, the same as any other plane. The bit is adjusted for depth of cut by the nut and rod in the upper arm. An adjustable fence which is supplied with the plane is shown in the engraving, and is so constructed that it can be used on either side. It is clamped to rods by split sleeves which prevent slipping in planing against knots. A depth gauge is also furnished, but when less than the full width of the plane is used a part of the face can be used as a depth gauge or as a fence for side beading. Cutting spurs are likewise furnished, which can be used for all work desired. The planes are made of malleable iron and steel, and all parts are nickel-plated. They are mounted with rose wood fences and handles. The makers, in sending out this article, supply with it a cut showing sections of the face of the plane and the position of the plates when set so as to fit different forms of bits. In the diagram a continuous line shows the shape of the bit, while above it shows the position of the different plates. One-half of the plates have half-round edges, while the other half have a cove and round, so as to fit in narrow places and sharp corners. The convenience of the tool is apparent.

### New Ratchet Screw-Driver.

The Ellrich Hardware Mfg. Company, of Plantsville, Conn., have recently brought out the ratchet screw-driver illustrated in Fig. 11 of the engravings. The screw-

*Fig. 11.—New Ratchet Screw-Driver.*

driver is manufactured in several different sizes, so as to be adapted for different purposes. The sizes range from 4 inches to 12 inches in length. The shank end of the bit is provided with a pinion-like piece which when in position comes between two ratchets so shaped as to allow the blade to be turned freely in one direction, while resisting movement in the opposite direction. The ratchets are arranged right and left, so that when one is down the screw-driver is fixed against revolving in one direction, while it moves in the opposite direction. On the other hand, when the second ratchet is down the reverse motion occurs. When both are down the blade is fixed. These ratchets are readily lifted out of place by means of the thumb-nail, so that the screw-driver is instantly changed from a right to a left, or *vice versa*. The tool is neatly made and handsomely finished. We understand that the ratchet attachment is put upon a handle and packed in a box with four blades, and sent in this form to purchasers desiring it. This present form of screw-driver, we learn, is the result of patient experimenting upon the part of Mr. Ellrich, the inventor, and we are assured that all of a number of thousands that have been sold have given excellent satisfaction.

### Loose-Pin Spring Hinge.

The Ohio Butt Company, of Morris, Ill., with Chicago office at 55 Dearborn street, are putting upon the market a loose pin-spring

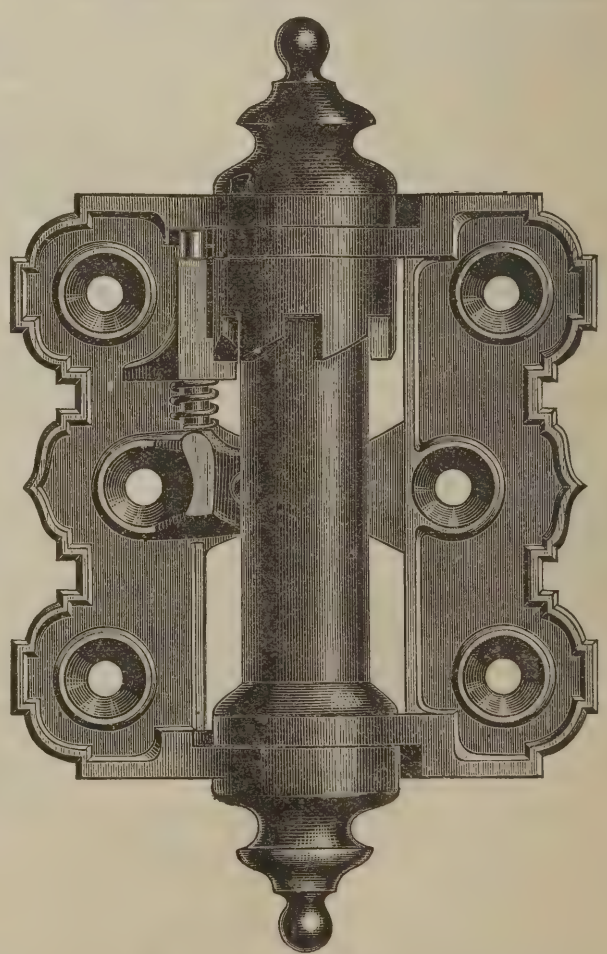
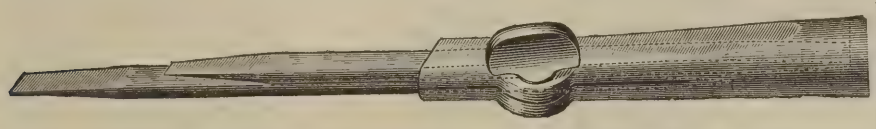


*Fig. 12.—Loose-Pin Spring Hinge.*

hinge which, on account of several novel features, is of interest to our readers. Loose-pin spring hinges have been attempted

many times in the past, but the present article seems to be more of a success than any other which we have had the opportunity of examining. The pintle is easily removed, and when this is done the two leaves of the hinge may be readily separated. Accordingly, doors hung with these hinges can be removed with the same facility as if hung with ordinary loose-pin butts. The pintle can be removed without danger of loosening or dropping any of the smaller parts of the hinge. The tension ratchet of the hinge is arranged in such a way as to make it a very simple matter to set the hinge to any tension that may be desired. No special tool is necessary, the point of a



*Novelties.—Fig. 13.—The Standard Screw-Driver.*

screw-driver or even a 10d. nail answering every purpose. The third point of novelty, and one also of utility, is the incasing or covering of the spring. The spring is placed inside of a strong metallic tube fitting the spring clutches at either end and forming adequate protection against dust, rust, &c. We are assured by the manufacturers that the wire used in forming the springs is of the best quality of steel, tempered expressly for the use to which it is applied. The sample which we have had the pleasure of examining is neatly fitted

*Fig. 14.—Blades for Standard Screw-Driver.*

and seems well adapted in every respect for the use for which it is intended. The makers assure us that they make a specialty with all their goods of careful, painstaking work, subjecting the finished pieces to rigid scrutiny, and packing only such goods as are perfect in every particular.

### Loose-Pulley Lubricator.

E. & F. Gleason, northwest corner of American street and Susquehanna avenue, Philadelphia, are directing attention to their loose-pulley lubricator, an illustration of which is shown in Fig. 15 of the engravings. The letter B represents the pulley, C the sleeve, E the collar end of the sleeve and *x* the oil chamber. The oil channel is indicated by letters *b* and *c*; *a* is the solid part of the collar for the screw. The chamber is filled through the hole E, and the oil is drawn to

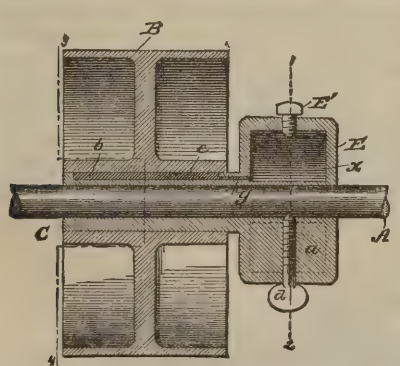



*Fig. 15.—Gleason's Loose Pulley Lubricator.*

the pulley by means of felt which is fitted into the oil channel already referred to. This felt is extended into the oil chamber. As the pulley revolves on the sleeve the oil is drawn from the chamber. Among the advantages of this lubricator the following are mentioned: There is no waste of oil in its use, as the pulley draws from the chamber only as it is used. The loose pulley does not run upon the shaft, but instead upon the sleeve; consequently the shaft is not worn at all. By the fact of the pulley running upon the sleeve the wearing surface is increased by two and one-half times. As the pulley does not run on the shaft, an old shaft that is badly cut can be used with this device.

### The Standard Screw-Driver.

The Standard Tool Company, Hartford, Conn., for whom W. H. Jacobus & Co. are agents, 90 Chambers street, New York, are putting on the market a new screw-driver, which is illustrated in Figs. 13 and 14. The general form and appearance of the screw-driver is indicated in Fig. 13, while Fig. 14 represents the two blades which are made for use in it. It will be seen, as indicated in Fig. 14, that the blades are double-ended, and give four sizes of screw-drivers, running from $\frac{3}{16}$ to $\frac{1}{2}$ inch, a sufficient range for ordinary use. As indicated in Fig. 13, both blades are inserted at the same time in the handle, which is so arranged that the blade which it is desired to use projects beyond the other. This is accomplished by a construction which permits the idle or upper blade, as shown in the cut, to slip further into the socket than the one in use. When the blades are thus given the desired position they are readily secured in place by the thumb nut shown. In referring to the advantages of this screw-driver the manufacturers allude to the fact that the four points are of different widths and fit any size of screws, and lay special emphasis on the point that there are no loose parts to mislay or lose, as the blades are never taken out except for changing the points, and must be kept together. That the tool is self-containing and needs no box is also mentioned, as well as the facility with which changes are made in the points to be used. The full length of the screw-driver is 12 inches, and it is described as strong, properly tempered and handsome, being made of the best materials and nickel-plated, with apple-wood handle.

### Domestic Sash Lock.

In Figs. 16 and 17 there are illustrated two forms of sash locks offered to the trade by B. Gautenberg, of Covington, Ky. The locks are alike in principle, but differ in construction and the manner of applying. The lock consists of a hollow barrel through which a bolt passes. The bolt is forced outward by means of a spiral spring, one end of which rests under the bolt head and the other against the face plate of the barrel. By giving the bolt a quarter-turn when forced into place it is securely locked. By reference to the engravings it will be seen

*Fig. 16.—Domestic Sash Lock.*

that one style of bolt is intended for inserting through the sash, while the other is provided with a plate for screwing against the top surface of the sash. The plate which attaches to the upper sash is modified so as to correspond with the difference in construction of the bolt already referred to.

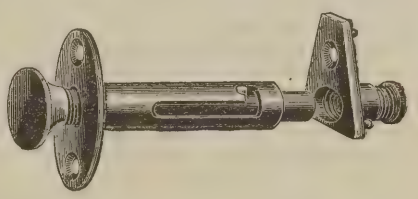


*Fig. 17.—Modified Form Domestic Sash Lock.*

The samples which have been submitted are handsomely nickel-plated.

### The Great American Wrench.

This article, which is manufactured by the Augusta Wrench Company, Augusta, Me., for whom Irwin Neale is agent, 88 Chambers street, New York, is represented in Fig. 18, which clearly indicates the form in which it is made and the principle on which it works. It will be seen that instead of having the wrench operated in the usual manner the adjustment is accomplished by turning the handle, thus giving a strong grip. Its utility as a carriage wrench, from the fact that the nut is not liable to slip and fall into the dirt, as well as for use as an agricultural wrench and general use, as it fits nuts of different shapes and can be used in inaccessible places, is alluded to. It is described as made of malleable iron, the screw part steel, with a corrugated wooden handle, which is not, however, so shown in the cut, for the purpose of giving a secure grasp. It is made in sizes running from 6 to 21 inches.

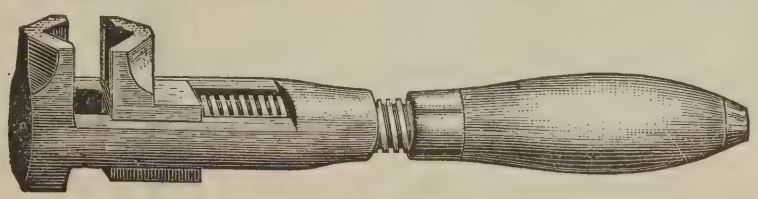


*Fig. 18.—The Great American Wrench.*

### Dado and Grooving Head.

An important addition has been made to the assortment of cutter heads manufactured by Samuel J. Shimer, of Milton, Pa. The article is shown in Fig. 19 of the engravings, and is a dado head made upon the same principle as that of the combination

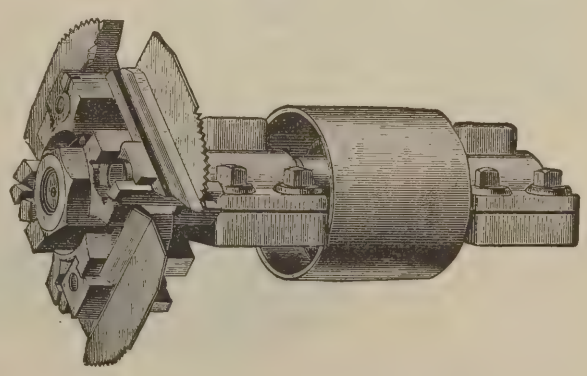


*Fig. 19.—New Dado and Grooving Head.*

door, sash and molding heads with which the trade are familiar. The tool is especially adapted to that class of work where grooves are cut across the grain of boards or lumber as used for making frames, boxes and the like. The work done by it, the manufacturer assures us, is perfect. There are no ragged edges, and all is smoothly cut even with the fastest speed. The construction is such that the bits can be expanded for wider grooves or contracted for narrower grooves in an instant. Each set of bits will work nearly double the thickness of a single bit—for example, a set of bits ½ inch wide each will make a groove $\frac{15}{16}$ inch, or they can be set to work at any intermediate width—that is, from ½ inch to $\frac{15}{16}$ inch. Each piece is provided with a gauge, carefully fitted, which shows the position at which to fasten the bits, and also the angle at which to file them—an important convenience which will be generally appreciated by the trade. By reference to the engraving it will be noticed that this tool is similar in its make-up to the well-known combination head made by the same manufacturer, with the addition of sectional saws which adapt it to the purpose of dadoing.

### Cross Tower Ornament.

Messrs. J. E. Bolles & Co., of Detroit, Mich., have recently brought out the accompanying design of tower ornament that will be of interest to many of our readers. In the design the elements of the cross have been freely employed. The article is furnished, as may be desired, either with or without the side ornaments. Means for fastening the ornament in place are indicated in the illustration.

### Wilkinson's Tool Handle and Pin Vise.

The accompaning illustration, Fig. 21, represents this article, which is put on the market by A. J. Wilkinson & Co., 180, 184 and 188 Washington street, Boston. It is intended for holding drills, files, keyhole saws, &c., and all sizes of round wire not larger than $\frac{8}{16}$ inch diameter. For use with flat articles, such as keyhole saws, it has an opening in the ferrule $\frac{8}{16}$ x ½ inch at right angles with the jaws. By turning the ferrule the jaws are opened or closed as desired, and a firm grip is secured on the tool inserted. The jaws, ferrule and working parts are of steel. The tool is neatly made and well finished.

The Builders' Exchange of Pittsburgh, composed of master carpenters, plumbers, &c., have adopted a constitution which states that the objects are the promotion of industrial and mechanical interests among the various trades, and to adjust controversies and misunderstandings as far as practicable without recourse to the courts. Disputes between members may be referred to a board of arbitration, each party naming one member and they a third, for whose services a fixed scale of fees, graduated according to the amount involved, is provided. Parties to a dispute may obtain a new trial by a new committee of arbitrators and may then appeal to a committee of appeal of five members. Arbitrators are to be sworn according to the State arbitration law, and if either party to a dispute fails to comply with the award the president may, at the request of the winning party, file the award in the Court of Common Pleas within 15 days after the award is given and have judgment entered on it. The object of this system, which is the first attempt to apply the arbitration law to business disputes, is to keep disputes between contractors out of court and settle privately at small cost and on certain general principles applicable to all.

*Novelties.—Fig. 20.—Design for Finial.*

### Modern Roofs.

A Chicago correspondent of the *Sanitary Engineer* some time since interviewed Mr John W. Root, a well-known architect of that city, on the general subject of the design and construction of roofs as employed in the summer villas of the day. Mr. Root's remarks on this occasion are of interest to all who consider the subject of roofs as a part of the general design of the buildings which they cover. We quote as follows:

Nothing is truer than the fact that in all inclement climates the most vital element of external expression is the roof. Mr. Ruskin has called attention to the fact that in rain or snow an open shed with a good roof is better protection than four solidly built walls without one. For this reason the natural development of architectural types in warm climates like those of Italy, Spain and Palestine causes the roof to be universally treated in a subordinate way, frequently not showing at all, and this not only for the reason that the roof is frequently used in part for habitation, but because in climates where thorough protection from inclement weather is so needless a strong expression of the roof was not felt to be necessary. In Russia, Sweden, Denmark, and all other countries where cold weather prevails through a large part of the year, a natural development has resulted in the evolution of large roofs, showing that instinctively and without the imposition of outside influences the roof expression of the house is felt to be essentially interwoven with conditions of climate. For this reason nothing is more natural and more proper than that in a climate like ours, all that is to be expressed of protection and shelter which the roof is capable of expressing, should be put into the designs of our houses. Of course, if the lines of the roof are so broken up and its general masses so intruded upon by all sorts of small dormers and other apparently adventitious features that even a lay observer feels the difficulty of its construction and its tendency to admit water freely at all its various joints, the roof will fail in expressing exactly the idea it was intended to convey. But when the broad principle is laid down that the frank expression of the roof can be made to convey the desired sense of shelter, then, without straining the idea into false channels, the inherent motive and value of the roof can be readily seen. It is true that ours is not only an arctic, but in a certain respect a tropical, climate, and for one of these reasons as well as the other there should be an intervening air space between the exterior roof and the interior ceiling of every building. If the roof of the building is also its ceiling, it does not matter whether the roof has a low or high pitch, the result is practically the same. And in general it might be stated that the flatter the roof the hotter, for the reason that the sun's rays fall more perpendicularly upon a horizontal than upon a vertical surface No mathematical engineer on the one side nor poetical idealist on the other is able to interfere with the evolution of essential architectural ideas, especially in this transitional period of the science. The fruitful periods of architecture are its transitions. There are comparatively few fruitful ideas to be gained from the finished Parthenon or from Cologne Cathedral, but at Amiens, Bauvais, and in much magnificent transition work in France, there is immense suggestiveness.

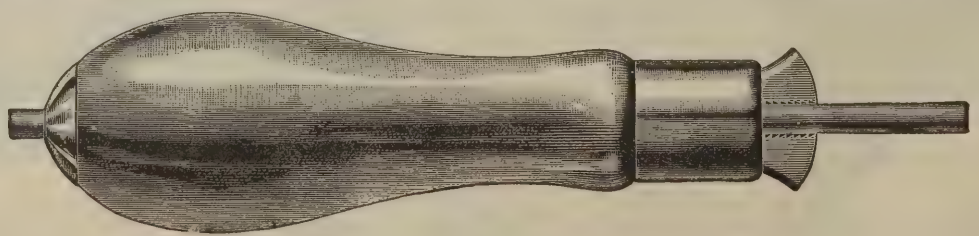
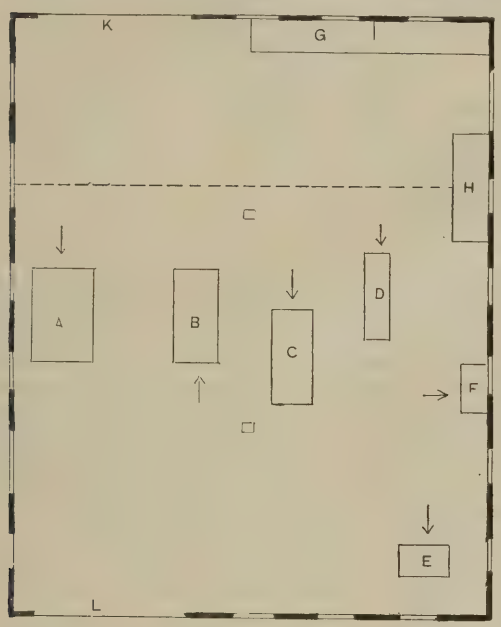


*Fig. 21.—Wilkinson's Tool Handle and Pin Vise.*

# CORRESPONDENCE.

### Arrangement of Wood-Working Establishments.

*From* S. W. C., *Yonkers, N. Y.*—In a recent issue of *Carpentry and Building* there was a call for a shop plan showing the arrangement of machinery. In reply I will give you my ideal of a mill. Referring to the accompanying sketch, the building shown is 40 x 50 feet in dimensions. The dotted line indicates the line shaft. The arrows show




*Plan of Wood-Working Establishment, Submitted by S. W. C.*

the fronts of the different machines. A is a planer, B a rip saw, C molding machine, D jointer, E tenoner, F mortiser, G cut-off saw and H laying-out bench. The lumber is brought into the mill at the door marked K and is run through the planer, if it is only to be dressed, and is then taken out through the door L. If it is to be worked it is delivered in front of the saw table B and by this machine sawed to width, after which it can be either cut up or jointed or molded, as wanted. I should recommend that the engine and boiler be in a separate building, 6 or 8 feet to the left of the main building. With the top of the main shaft revolving toward the front of the building there will be no crossed belts for running the machinery here shown. The stairs to the upper floor may be to the right as you go in at the door L, with a trap door in the second floor over L. The square places near the center of the plan represent posts for supporting the second floor.

### Ownership of Plans.

*From* G. F. R., *Westerly, R. I.*—In the November number of *Carpentry and Building* "S. B. B.," of Appleton, Wis., replying to my communication on ownership of plans, published in a former issue, asks what my opinion is in case a house owner comes to an architect and says: "What will you charge me for plans for such and such a building? I do not want you to superintend the building, but I want you to supply the drawings alone." Any architect approached in that way would no doubt ask a price, but he would still claim the plans to be his property. I see "S. B. B.'s" point, but he does not state the matter as he means, I think. In order for a person to obtain a set of plans to be his own property it is necessary for him to positively agree with his architect to that effect, or the architect will surely claim the plans as his in case any question is raised. Of course in most instances he would not ask for the return of the plans. A case came to my notice only to day. I was in an architect's office for the purpose of looking over the plans of a house which is to be built. The owner is to superintend the work himself, and the architect fully understood that all that he was asked to do was to furnish the drawings and specification. Still he claimed the ownership of the plans. I know a gentleman who went to the same architect some time since and engaged him to prepare plans for a house, and paid him for them and carried them off as his property. The difference in the two cases was merely this: In the former the client asked some such question as "S. B. B." proposes, while in the latter the matter was correctly understood. Most architect's drawings are labeled or stamped: "To be returned to the architect at the completion of the job." In some cases the architect specifies that the drawings shall be returned before the final payment is made. In my own experience I have known this to be required, and yet I have stacked away many sets of plans and details of houses which have been built, the drawings never being returned to the architect, although his ownership to them was fully acknowledged.

In reply to "S. B. B.'s" further inquiry I would say that very few architects make up the details of a house much in advance of the time they are wanted for actual use. In many cases they do not do this until the builder asks for them. If the builder be a competent man he will require less details than one who is incompetent. All of this the architect takes into account. His fees cover all necessary drawings. I agree fully with "S. B. B." that practical builders would be able to suggest new and good ideas to architects, but, on the other hand, how many of the profession will receive them kindly and profit by them. I have known some architects who would do this, and who have been glad to avail themselves of the practical skill of the builder in getting out of some bad scrape where the work did not come out as the architect had supposed it would, but as a rule circumstances differ from this. I would like to see all the features of this question fully discussed. It is one of importance to the trade at large.

### Problem in Hand-Railing.

*From* W. H. C., *Orillia, Ont.*—Responding to your invitation contained in *Carpentry and Building* for July, I send you solution of the elliptical prism problem propounded in your comments on "S. B.'s" communi-

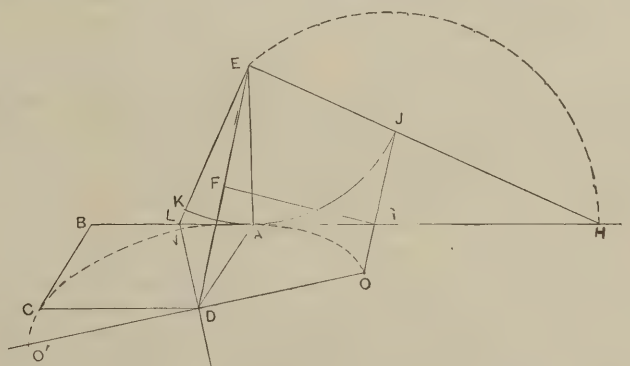



*Diagram Accompanying Letter from W. H. C.*

cation. I have noticed that books on practical geometry rarely contain the necessary information dealing with elliptical cylinders and their oblique sections, and perhaps on this account you concluded the problem had not as yet been solved. Referring to the diagram, let A B C D represent the resulting parallelogram of the oblique section. Make A E square with an equal to A B; connect E D; bisect E D in F, and draw F G square to E D, intersecting B A produced in G; on G, center, with radius G E, strike the arc E H, intersecting B A produced in H; connect H E and draw E L square to E H. Now the major axis will pass through H and D, and the direction of the minor axis will be D L. We next obtain the limits of the axes; on E, center, radius E A, strike the arc K A J, as shown; draw J O parallel to D E; O D will then be half the major axis. From K draw K N parallel to E D, and D N will be half the minor axis. To find the point where the face mold is equal to the width of rail, draw the center curve of face mold and a tangent to the curve at right angles to a level line on the oblique plane, and the point of contact will be the normal required; this point in Fig. 10 of your July number will be somewhere near B 6.

### Efflorescence on Brickwork.

*From* ARTUS, *New York City.*—In reply to the inquiry of "H. R. C." in a recent number of *Carpentry and Building* I would say it is not at all uncommon to find the efflorescence of sulphate of magnesia on bricks piled in the brickmaker's yard, and in such cases it arises from the clay from which the bricks were made. In a wall it may proceed from either the mortar or the bricks, but usually it proceeds from both. Many cures have been suggested, none of which, however, can be relied upon in all cases, although either of them would do something to mitigate the evil. Among these are thoroughly scrubbing and washing off the exudation with water; washing the wall with muriatic acid, ½ pound in a pail of water; and painting the wall with a thick coat of oil paint. The success of either operation will depend upon the severity of the case and the position of the wall. I have seen the efflorescence come out again within two weeks of the wall being washed, and have frequently seen it force a coat of paint out in blisters. There is this comforting fact, that after some time it exhausts itself, so that washing it off as often as it appears is, where practicable, a means of effecting a permanent cure. There is a very exhaustive paper on this subject by W. Trautwine, C. E., contained in the *Journal of the Franklin Institute*, issued about April, 1878.

### Air-Slaked Lime.

*From* E. L. R., *McMinnville, Tenn.*—I desire to ask the readers of *Carpentry and Building* if lime which has lain exposed to the weather until it has become dry powder is fit for use in buildings. I have been rejecting such lime on the buildings that I have had charge of in this vicinity this season, but have been censured by many who hold that the lime is all right and to throw it away is great waste. I think myself it would be a greater waste to put it in a building. I think, if the same habit prevails in Charleston that does in this vicinity and elsewhere that I have been in the South, that the New York architect referred to in a recent issue of *Carpentry and Building* was right when he said that the buildings in Charleston tumbled easily because they were put up with bad mortar.

*Note.*—The question raised by our correspondent is a very interesting one, and we shall be pleased to see it discussed in our columns. The majority of builders, we imagine, will declare that air-slaked lime is unfit for use in mortar, but when it comes to stating the reason why it should be rejected there may not be such unanimity.

Almost all the books which we have examined give directions for inspecting lime before it is used, and advise the rejection of all that is even partially air-slaked. They do not explain the reason, however. They do not tell why air-slaked lime is not as good for use as water-slaked lime. In Mahan's "Engineering" occurs the following: "Quicklime, when exposed to the free action of the air in a dry locality, slakes slowly by imbibing moisture from the atmosphere, with a slight disengagement of heat. Opinion seem to be divided with regard to the effect of this method of slaking on fat limes. Some assert that the mortar made from them is better than that obtained from any other process, and attribute this result to the reconversion of a portion of the slaked lime into a carbonate; others state the reverse to obtain, and assign the same cause for it. With regard to hydraulic limes, all agree that they are greatly injured by air slaking."

### Learning Architecture.

*From* E. L. H., *Little York, Ill.*—Will you kindly inform me through *Carpentry and Building* of the best way to acquire a thorough knowledge of architecture with a view to following it as a business? What would be the probable cost of the same?

*Answer.*—If our correspondent has any idea of becoming a professional architect we advise him to strive for the highest honors in the profession. Architectural business, like many others, is crowded in the lower stories, and there is only room higher up. By whatever means is in his power let him acquire a common school education, and to this add the training of a good technical school, spending the time in the classes that are organized for the architectural course. For this purpose we would suggest Cornell University, at Ithica, N. Y., or the Massachusetts Institute of Technology, at Boston, Mass. After acquiring a theoretical knowledge in this way we suggest that some time be spent in acquiring the practical details of the business—in other words, as an apprentice in some office, under competent management. At the end of such a course our correspondent will find himself in a position to make his mark in the world, and anything less than this preparation for the profession at the present time is inadequate. It is impossible for us to give even an approximate estimate of the cost of such a course. Some can pursue it at one-half the expense that it would cost others. More or less time may be devoted to the subject, according to the physical and mental strength and general ambition of the student. An approximate estimate of some portions at least can be made after sending for the catalogues of the two institutions mentioned above.

### Question in Patent Law.

*From* E. S., *Newark, N. J.*—I should like to see the following question answered in *Carpentry and Building:* Whether a patentee can claim royalty on sales made after the expiration of his patent, the goods having been manufactured previous to the date of expiration?

*Answer.*—The answer to this question depends entirely on the wording of the license given by the patentee to the manufacturer. Very frequently, and we believe almost always, the license provides that a certain royalty or percentage shall be paid by the manufacturer on all sales made by the latter. This contract only holds good, of course, during the life of the patent, and after the expiration of that term any one can freely manufacture and sell the article without paying any royalty. All that the patentee can claim under such a license would be his royalty on the sales made before that time. Nothing is due for any sales made after that time. The reasonableness of this will be readily seen when it is remembered that there is no damage done to the patentee by the mere manufacturing of the articles. The manufacturer selling after the expiration of the patent has to compete with other manufacturers, and is no more obliged to account for his sales than they are. Of course, if there is any fraud in the transaction, if the sales were in reality made before the patent ran out, and the articles were held for mere delivery afterward, and these facts could be proved, the patentee could claim his percentage, because the sales were in reality affected previously, and are thus covered by the terms of the license. Sometimes the license provides for the payment of a fixed sum every year, independent of any sales, and in that case the question proposed by our correspondent would not arise. If the terms of the license were such as to include a percentage or royalty on goods manufactured, whether they are sold or not, the patentee could claim, in the case proposed, such percentage. The terms of the agreement must be examined in any particular case to determine the rights of the parties, and this is the only test.

### Advantages of Felt Under Tin.

*From* A. M., *St. Louis, Mo.*—I am of the opinion that good, soft felt, without anything to act chemically on the tin, will be of great advantage in prolonging the life of the roof. First, it will shut off any injurious substance that would reach it from the atmosphere from below, and also protect it from any injurious substance contained in the sheathing boards. It will also protect it from abrasion, caused from the motion produced by wind. Lastly, it will be more agreeable, as it will deaden the rattling, which is very annoying in windy weather, especially in dwellings. I am decidedly of the opinion it will always pay to put a good, thick, soft felt down to lay tin on.

*From* O. G., *Troy, N. Y.*—Thinking the matter may interest you, I send you my experience in regard to the matter of felt under a tin roof. Four years ago I tinned a large smith or foundry shop. Knowing that the gases from the many fires below would soon destroy the tin unless protected in some way, as the roof boards were not matched and not even close-jointed, I put on felt or sheathing paper under the tin. This spring I examined the roof and found it in good order, except at the side wall, where the paper did not reach up. Here the gas had destroyed the tin. I would recommend paper under all flat tin roofing, as it absorbs the moisture always found on the under side of a tin roof, commonly called "sweating," and so tends to make the roof more durable.

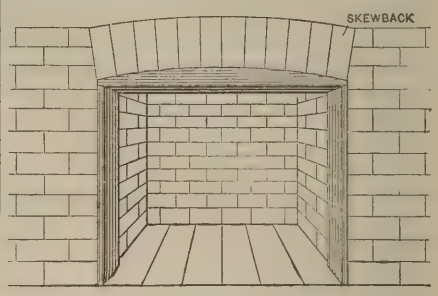
### Question Concerning Patents.

*From* W. P., *Mendota, Ill.*—Suppose a principle has been in practical and successful use for eight years in one part of the country, and that it is then patented by parties in another section of the country, they not knowing of its former use; what effect would that have on the patent? Would the previous use invalidate it?

*Note.*—Correcting our correspondent's inquiry to the extent of disclaiming a patent on a principle, we would say that the former use of an improvement would invalidate the patent provided such former use could be proven. We take it that our correspondent means that something has been patented which it is subsequently discovered has been in common use in another portion of the country remote from the location of the inventor. This being the case, the patent has been granted in error—that is, for lack of knowledge of the state of the art upon the part of the Government examiners—and upon legal proof being submitted that such is the case a supposed infringer would go free. This is answering our correspondent's question in the most general terms. It frequently happens that something is patented which, in the estimation of the lay members of the community has been in previous use. There is such a similiarity that the mistake is easily explained, yet it will be found when the facts come out that the patent relates to some special means of construction if it be a machine, or some special combination in case it be a process. The question that our correspondent asks in order to be definitely answered should be submitted to a competent attorney, with all the facts in the case, including a copy of the patent.

### Practical Centering.

*From* O. B. M., *New York.*—Centering may be described as an auxiliary art employed by masons in building construction for the purpose of sustaining temporarily the *voussoirs*, or pieces of stone or brick which form an arch, holding them in their correct position until the last or keying piece is inserted and the whole arch has




*Centering.—Fig. 1.—Simple Fireplace.*

had time to settle into place. The temporary supports used are called "centers" and are usually supplied by the carpenter. It devolves upon him to put them in correct position under the intended arch whenever required by the mason. Centers, accordingly, must be constructed of correct shape and in a way to have sufficient strength, both by nature of the form and the material employed, to resist the weight which

*Fig. 2.—Getting the Curve.*

is to be placed upon them. The centers must be firmly fixed in place, and yet, as they are only for temporary use, provision must be made for gradually lowering them for the purpose of taking them out when they have fulfilled their mission. There are many kinds of centers required for the different designs of arches which are constructed, reaching from the simple brick

*Fig. 3.—Another Form of Center.*

lintel to the complex groin. All of these demand care in their design and construction.

In an attempt to illustrate principles and show methods of construction I will commence at the simplest form—namely, that which is illustrated in Fig. 1 of the accompanying sketches. While this example may be considered elementary and is certainly easy to understand, it, in fact, involves the whole principle of centering.

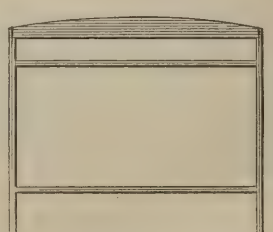
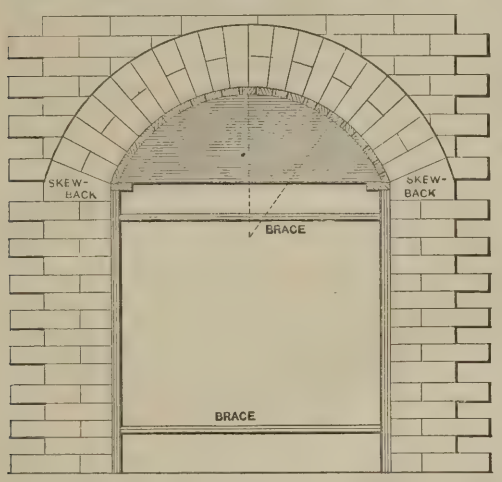


*Fig. 4.—Center and Supports.*

The view represents an open cavity or fireplace 2 feet 6 inches wide and 3 feet high, over which the bricklayer has to build an arch, or, as it is commonly called, "extend a brick lintel." To construct the center necessary for this purpose the carpenter would use first a piece of ½-inch pine somewhat longer than the width of the opening between the jambs, and would joint one of its edges. He would then square across both ends $\frac{1}{16}$ inch shorter than the width of the opening and draw a

line parallel to and 1 inch removed from the jointed edge, all as shown in Fig. 2 of the illustrations. He would then divide the length into two equal parts and square across the division point. Then, laying the piece of board down on the bench and tacking it there, he would drive three nails, as shown in the sketch, one at each springing point, or where the




*Practical Centering.—Fig. 5.—A Window or Door Opening.*

curve cuts the parallel line already referred to. He would drive one also at the crown or middle point, as indicated. He would then bend a pliable lath around the three nails and mark by it the required curve of the arch. He would next saw out clean this line, using for the purpose a compass saw or band saw in case the work is being done where such a machine is available. He would also saw across with the square lines, and would finally clean the curved edge neatly. By this means the mold would be secured for the center, or for several centers if more than one be needed. In preparing the piece for the center this mold would be used on both sides of a piece of 2 x 4 inch stuff, marking the desired shape. This would then be sawn to the line and cross-cut on the square lines, resulting in the same shape as the mold already described. The resulting piece would be the center on which the arch would be turned, having a rise, according to the conditions already mentioned, of 1 inch. The length of the uprights to be used under the arch would be 2 feet 11 inches. This added to the thickness of the center, 1 inch, already mentioned, would give 3 feet to the spring line. Another form of center sometimes employed is illustrated in Fig. 3. This is worked to triangular form, the curve being added by means of mortar put in place by the mason as he lays his brick. Arches built this way, however, are not so satisfactory as when laid upon centers finished to the exact curve required.

To set the center the carpenter would proceed as follows: He would construct

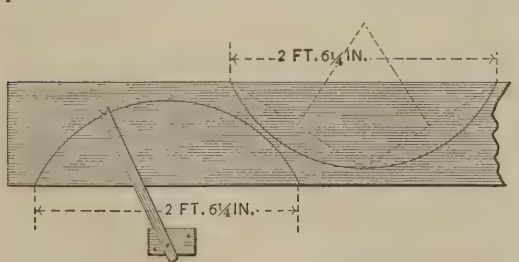



*Fig. 6.—Striking the Curve.*

the frame shown in Fig. 4, the uprights of which are 1 x 4 inches, and would place it in the opening in Fig. 1, keeping the front edges of the uprights flush with the face of the brickwork. Two braces would be driven in, as shown in Fig. 4, between the uprights to hold them fast against the jambs. The center would then be correctly leveled by applying the spirit level to the bottom side of the center. Whichever side was too low would be furred up. The mason would then proceed to turn the arch as shown in Fig. 1. To ease the center the braces would first be gently knocked out, and then the bottom ends of the uprights would be forced outward from the jambs toward the middle of the opening. By this means the arch would be lowered uniformly.

Fig. 5 represents a segmental arch spanning a door or window. It may be assumed to be 2 feet 8 inches wide, with a rise of 12 inches, and the wall may be assumed to be 8 inches thick. To make a center of this kind the carpenter would proceed as follows: A rough, sound board 1 inch thick, equal in width to the rise—that is, 12 inches—would be used in the manner shown in Fig. 6. The center by which to construct the curve would be found as shown to the right. The curve would be struck by means of a trammel, or in the absence of this a rod would be cut equal to the radius of the curve. A brad awl would be driven through the center of the rod, a block being placed under for the purpose of raising it up to the thickness of the board, and the curve described as shown at the left in Fig. 6. The springing line in this case would be 2 feet 6¼ inches long, or 1¾ inches less than the length of the arch, in order to allow for the thickness of the battens forming the top of the arch. These would be ⅞ inch in thickness, and one of them would come on each side, thus making it necessary to allow twice seven-eighths. After the curve had been struck in this manner the carpenter would cut the piece out of the board, clean the curved edge neatly to the line, and, using this as a pattern, mark out as many as might be required for the number of arches to be constructed. A pair would be necessary for each center. Standing the curved pieces on their bottom edges, as

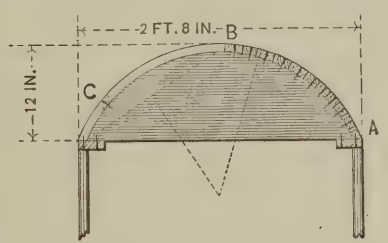



*Fig. 7.—Construction of the Center.*

shown in Fig. 7, parallel to each other and 8 inches apart, measuring between outside faces, the workman would next tack on three battens, as shown at A, B and C in Fig. 8. He would use for this purpose 8d. common nails Then, commencing at point A, he would nail on the other battens, putting them ½ inch apart and keeping their ends flush with the face of the curved pieces, all as indicated in Fig. 7. For the purpose of accurately spacing the battens a piece of ½ inch stuff about 10 inches long would be used. Two cleats would also be nailed across the bottom edges of the curved pieces, as indicated in Figs. 5 and 8, their purpose being to form a rest for the center on the top of the uprights. Fig. 9 shows a bottom view of the center, constructed as described, and indicates the position of the uprights which are used to support it.

To set this center the workman would use either boards or 4-inch studs for uprights. He would toe-nail them to the cleats on the bottom of the curved pieces, and would then put in place the braces shown in Fig. 5, to hold everything in position. The braces would be driven in so as to force the uprights tight against the brickwork. After this the work should be leveled, as already described. It is absolutely necessary to level correctly in order to correspond with the level joints in the brickwork. After the arch has been built by the mason it is usual to ease the center a little to allow for settlement. This is done by prying out the ends of the jambs, as already mentioned. Small arches do not settle much, and accordingly they do not require early easing.. On no account must the center bear in the least upon the jambs or the wall, nor should pieces be nailed to the wall to support the center. A center properly constructed is a separate piece of work placed and removed without jarring the permanent construction.

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### Moving Buildings.

*From* T. H. R., *South Fincastle, Ohio.*—Will some of the readers of *Carpentry and Building* please inform me how to construct a horse-power windlass for moving buildings? I want something that will be suitable for drawing with a single line running direct from the building to the windlass

*Fig. 8.—Bottom View of Center.*

without a combination of blocks, and one that will be self-anchoring and have sufficient strength for drawing a heavy building.

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### Coal Tar and Gravel Roofs.

*From* C. G., *Atlanta, Ga.*—I have had a a great time this year and last removing coal tar and gravel roofs and putting in place tin roofs. The coal tar and gravel roofs had not been on the buildings to exceed eight years, showing that the life of such roofs is very short. On the other hand, I have taken off old tin roofs that have been in service as much as 30, 35 and 40 years, Under the tin roofs I have found the sheeting sound and clean, and much of the tin bright on the under side and still capable of service. With tar and gravel roofs, however, some of which have not been in use over six years, I have found the sheeting warped and cracked, and in many cases badly decayed. The roofs are always depressed in the center, sometimes sagging as much as 4, 5 or even 8 inches, resulting in a sort of fish pond in the center. Will you please give me your opinion of tar and gravel roofs? For my part, I do not think they are fit to be put on cow stalls, much less on respectable buildings.

*Answer.*—If our correspondent travels much and examines roofs as he goes along, he will find that there are various grades of tar and gravel roofs. From his account it would seem that he has met with some of the poorest and meanest roofs of their class.

*Fig. 9.—Top View of Center.*

We have seen tar and gravel roofs—or composition roofs, as they are frequently called—that were quite respectable in their appearance and quite economical when first cost and general durability are taken into account. While we are not as well pleased with roofs of this class as we are with slate and metal roofs, we still feel bound to do them full justice, and we think that in many cases, where first cost is a prime consideration, they answer a most excellent purpose. With reference to sagging, the fault should not be charged to the roof covering; it is evidently the fault of the roof framing, and the roof sagged because there was not sufficient strength in the framing to support it. We venture to say that the roofs of which our correspondent complains were carelessly laid with a very poor quality of felt, used sparingly. A good coal tar and gravel roof is not so cheap in comparison with other materials as to cause it to be very widely sought

for. For the most part, people who want roofs of this class are anxious to obtain them very cheaply indeed, and therefore they do not stand on actual quality; hence the reputation which tar and gravel roofs very generally bear.

### Sweating Roofs.

*From* C. F. D., *Oconto, Wis.*—I put on an iron roof in this neighborhood about a year since. Last winter the owner of the building complained that the roof leaked. I went up to look at it. The roof is of the gable variety. I found a little snow here and there, but the greater part of the roof had no snow upon it. Apparently the roof leaked as much where there was no snow as it did where the snow lay. In any event, there was not enough snow to cover the caps on the seams. Can you explain the cause of the leaking or give me some idea of a method for stopping it?

*Note.*—Our correspondent speaks of a leak in the roof, and yet he does not say anything about imperfect seams, holes, rust spots or other common causes of leaks. By the description that he presents we infer that, instead of the roof leaking, it is a case of sweating. We are only allowed to infer this, for no particulars accompany our correspondent's statement with reference to the kind of building on which the roof is placed or the temperature of the air immediately below the roof. We are not informed of the manner in which the roof was laid, whether on sheeting boards or with the under side of the iron exposed. We are disposed to believe that the under side of the iron is not covered, and that the building is tight, so that the air of the interior is much warmer than that of the outside. Under these circumstances condensation would take place, and drops of water in time would fall in a way to resemble leaks. If our inferences are correct some plan must be pursued by which the under side of the roof will be shut off from the warm air, either by an inclosed attic, thoroughly ventilated, or by some other means. Where metal roofs are laid over sheeting boards, with a layer of building paper or felt interposed, such difficulties are seldom encountered.

## Contracting Architects.

Some time since our English contemporary, the *Building News*, published the following article relative to the mingling of the architectural and building callings, with incidental reference to certain steps which have been taken in this country as well as elsewhere to keep the two apart. We republish it as likely to interest our readers, whichever side of the question they may espouse:

Encroachment on professional pastures is one of the evils endured by open, unrestricted professions, such as that of the architect. He has to endure it with as good a grace as he can, finding consolation in the assurance that his own reputation will not lose by comparison with the uncultured work of the interloper. Still, for all that, there is much to grumble at in the intrusion of the meddlesome and obtrusive builder who undertakes to provide plans for a new building free of cost on the chance of obtaining the job. To say the least, he is a dangerous enemy of the young and inexperienced architect, whose chief recommendation to employment is that he has plenty of time to devote to the work. Let us see what are the real advantages claimed by the "contracting architect." The strongest of the claims put forward by the architect saving builder is that he is a practical man, and that he can secure a considerable economy in the cost of building by having the direct control of the materials and labor. His practical knowledge of construction enables him to carry out the wishes of the employer in the most economical manner, avoiding the merely ornamental. No doubt the practical man is a great power in building, and will always be a match against the mere theorist and the artistic designer; but the magic of the word is lost when the interests of the builder and the employer are not identical. The builder's practical knowledge may be turned to very different account, according as it is directed to lighten the labor and cheapen the cost of building or to produce a substantial and artistic work. Which of these objects is the builder's?

Those who enter into contracts, if we give them credit for business-like tact, are not very likely to study the latter object when it is hostile to the profits. Again, the practical builder's ideal of a good building is not necessarily the highest. It means generally the avoidance of a large expenditure of material and labor, a very scrupulous attention to well-known and established methods and details, and a natural repugnance to invention and new methods of construction. The utilitarian, and not the artistic, is his conception of building art. On the contrary, the very nature of architecture is a bold renunciation of technical method whenever it interferes with the higher objects of building. The architect boldly rejects a well-known method for another if it is more to his purpose. He adopts new forms of construction to suit his design, and he is not compelled to follow slavishly any particular method because it is the least expensive or more direct. This freedom of choice in the adoption of any details or features is one of the leading points which separate the purely practical man from the architect. The former adopts the methods of construction which are best known to him as the simplest and most workable, while the architect often finds it better to adopt a new treatment for the sake of variety or expression in his design. The workingman's method is often simpler, and therefore cheaper, than the architect's, but it does not follow that it is the best. The word "practical" is a grossly abused word in the vocabulary of builders. If it be used in the sense of suppressing invention and design nothing can be more painfully abhorrent to the true artist; if it is intended to express the rule-of-thumb methods of execution it is equally subversive of scientific construction; on the other hand, the word may express the complement of the builder's attainments, that sense of experience and trained skill which should accompany the theoretical knowledge of the builder, architect or artist.

The "builder's plan" is often an aggravation of the worst points of the purely practical view of design. If we suppose it is the plan of a house, the arrangement is generally based upon some stereotyped form. The house is a square one; a center entrance with passage, and the stairs taken out of it, with windows on each side of the entrance, is the ideal form. The desire to economize material is usually carried to the excess of niggardliness; the walls and jambs are thin, space is cribbled from the passage and stairs and thrown into the rooms, the windows and doors are duplicated or multiples of one pattern; the roof is simply hipped all round. The decorations, such as the cornices, are repeated, and all sense of variety and expression is lost. The client generally pays in the long run for this parsimony in the shape of additions and alterations: he finds an improvement here and there needed; but the chief question is, Does he obtain a fair *quid pro quo* for what he has expended? We cannot but answer the question by a direct negative. Any one experienced in contract work will understand that the union of architect and contractor cannot give any guarantee for good work. Advising and contracting are singularly inconsistent functions; a man had better be his own builder than commit the control and execution to the same hands. Without the intervention of the architect a contract must be entirely at the dictation of the party who conducts the work and receives payment for labor of which he is sole judge; yet people are met with who run away with the idea that a building is like goods or some manufactured article which they receive for so much money, guaranteed to wear.

The fallacy in this idea is that the manufacturer's wares are ready made and can be tested before the money is paid, whereas the man who contracts to pay a sum for a house does so unreservedly before he sees it or knows what it will be. The French, who are a truly uncommercial people, argue correctly when they say that a contract is a bargain in which one man attempts to get the better of another. Either the client gets more work than he pays far or the builder receives more than his due. The first alternative is impossible when a builder draws the plans and contracts at the same time, and it is more than probable that the builder gets more than his due if he can make the bargain. Until the public can be brought to understand the difference between architects and builders there will be no change for the better. Half the people one meets with, especially among the business and lower middle class, with difficulty distinguish the difference between the two, and if they have a house to build they are quite content to put it into the hands of the builder, leaving him to plan as well as execute at a given cost. This state of things will probably continue till the public are taught to recognize the distinction better than they now do.

In France, which has long enjoyed the reputation of being an artistic nation, we find the two businesses quite distinct. There the architect is really what he should be, "master of the work," while the builder is not the capitalist, but is personified by a host of small workmen or contractors who only receive their instructions from the architect. We do not mean to institute any comparison between the two systems, but to point out that the French architect is acknowledged by the public as indispensable, while in England he is not so acknowledged. Building materials and labor are not at the mercy of the contractor in Paris—the official *série de prix* is the basis of all payments for work, and this is generally acknowledged. A *metreur* or quantity surveyor is appointed by the builder, and a *verificateur* by the architect, so that the employer only pays for actual materials and labor. In the English contract the employer on the other hand pays more or less than the fair amount, according as the tender or lump sum is great or small. One evil grows from this plan of tendering: The public believes that the architect, instead of exercising a restraining or correcting influence limiting the cost of building, rather tends to add to the cost; at any rate, they think the architect is of no service in checking builders' tenders, and that, therefore, they may go at once to the builder, and so save the architect's commission. We believe this is the main reason why many people prefer to obtain advice and plans from builders.

We lately noticed complaints made by some architects of builders willing to furnish drawings free of all charge to persons who think of building. The Cincinnati architects, as we lately remarked, have been trying to find a remedy for this invasion of their rights, and have passed rules debarring "contracting architects" from association membership, and, seeing that these rules were not sufficient to check the builders, have decided that hereafter "all builders making a practice of preparing or furnishing drawings to parties contemplating building will be debarred from the privileges of making estimates in the offices" of the members. We can sympathize with our Transatlantic brethren in this fresh grievance, but it appears that members of the profession in this country have the same complaint to make with their contracting friends. It is very easy for a local builder to ingratiate himself and intervene between the employer and the architect. He sends in plans on approval and gets an effective draftsman to draw an elevation. The saving of the architect's fee is a consideration. In provincial towns especially the enterprizing builder often interposes to his own advantage, and the too-confiding client concludes the bargain without considering that the estimate includes a percentage of profits which would have exceeded the 5 per centum commission. The estate agent and auctioneer are also intruders. We frequently see circulars and professional cards of this class announcing the preparation of plans and estimates for new buildings at a much lower percentage, and the public are taken in.

Architects have the remedy much in their own hands. This kind of invasion is due to several causes. A very prolific one is the misleading estimate followed by a long bill

of "extras." Other causes are inferior workmanship, bad planning, incomplete specifications and inconvenient arrangements, failure of construction and ornamentation—matters which are in the hands of the architect. He can by proving his competence and skillful supervision make it difficult for a builder to take his place. Sometimes his own charges are excessive. The Cincinnati architects have adopted prohibitive measures, and, it is to be hoped, with desirable results. Every architect has it in his power to refuse the tendering of such builders; but this would be difficult in certain cases, without a general rule such as that adopted by the Cincinnati chapter. We think the best remedy for the abuse is to be found in a more scrupulous attention to the responsibilities of both the architect and builder. So long as architects select tenders because they are low, and encourage undercutting practices, they cannot blame the builder for seeking to make the best of his opportunities, and recurring to tactics of the same kind.

More prejudiced to the profession than the builder who offers to furnish plans is the undercutting architect himself, who by various means endeavors to underbid his brother. There are very many such, we are sorry to say. The only check for such practices is the association or confederation of professional men. Architects, as we have recommended, should agree upon certain rates, for so long as exorbitant charges are made by some, and low ones by others, the public will hesitate; there will be the other evil of excessively low fees to fear. From the remarks we have made we have endeavored to show that the advantages to the public of employing the contracting architect are of a very questionable character, detrimental to good design and to the employer. The question also effects the workman. Cheap architecture and contracting architects are positively pernicious to the art workman, who becomes more and more ignored and robbed of his rights. The more general and "jack-of-all-trades" kind of hands can only find a living under the system of wholesale underbidding.

## Band vs. Circular Saws.

Band saws, says the *Timberman*, are probably the coming machines for making lumber where great economy of raw material is the thing to be most carefully considered. The experiments made, and the practical use of these implements during the last two or three years, demonstrate this much beyond any question. But because this is true it does not follow that circular saws are to become obsolete. They have made too good a record to be disposed of so summarily. There is no good reason for believing that circular saws will not be in great demand for many years to come, if they do not occupy a prominent place in the list of lumber-cutting tools as long as there is lumber to be cut. Both the band and circular represent developments of the same principle; they both accomplish their work by means of a serrated blade moving rapidly in one direction, therein differing radically from the principle of the earliest sawing machinery—that of a reciprocating movement—the highest development of which is seen in the modern gang. So handy, effective, reliable and cheap an application of the principle of a continuously-moving blade as is found in the circular saw cannot give way entirely to any improvement, however economical of timber it may be. For very many situations the circular mill, of low first cost, adapted to more or less rough usage, not easily got out of repair, rapid in its work, and altogether a reliable device, is better fitted than would be the most perfect band machine, though it might cut a kerf no thicker than a sheet of paper. The fact that there are so many places of this kind that can be better filled with a circular mill than with any other sort of lumber-cutting arrangement insures for it a demand and popularity that will not be perceptibly reduced by the encroachments of the band saw upon its domains. Indeed, it is possible that improvements may still be made in circular saws that will bring it close alongside the band in point of economy. Astonishing success has been achieved already in the use of thin saws, and who will venture to fix the limit beyond which improvement in this direction shall not go.

# TRADE NOTES.

THE OFFICE of the *Carpenter*, and the headquarters of the general secretary of the Brotherhood of Carpenters and Joiners, was on the 22d of November removed to Philadelphia, Pa. The object of this change does not appear in any of the notices which have reached us.

A VERY HANDSOME CATALOGUE has been issued by E. P. Allis & Co., of Milwaukee, Wis. It contains about 125 pages, printed on excellent paper, and includes numerous illustrations, which in general quality are far ahead of the average employed in such works. The general line of trade followed by this firm is the manufacture of saw-mill machinery and supplies. The frontispiece contains a bird's-eye view of the Reliance Works, the name by which the establishment is known. Other full-page illustrations in the book show views in the machine shop, saw-mill department, foundry, erecting shop, cranes and core ovens, &c. Various styles of improved sawmills are shown, including a band-saw machine which the firm have been manufacturing for some months past and which has gained enviable notoriety. The design of this machine is by Mr. G. N. Hinkley. The book is supplemented by a price list.

WE ARE IN RECEIPT of a photograph of the McCallum Building, Knoxville, Tenn., which was recently built to designs prepared by Mr. J. F. Bauman, of that city. The building is a substantial structure, with four stories and basement, built of brick, with white stone trimmings, and surmounted by a very handsome cornice. The principal room of the lower floor is occupied by the East Tennessee National Bank. We learn that the building is supplied with all modern conveniences, including one of H. J. Reedy's hydraulic elevators. The interior finish is of solid cherry and bright Georgia pine. The upper floor is occupied by the Chillowee Club.

THE EDISON ELECTRIC LIGHT COMPANY have issued a circular letter describing the rapid progress of the Edison electric lighting system. From this we learn that there are at present in the United States about 400,000 Edison lamps of an average of 16 candle-power each. Measuring their lighting capacity by the quantity of gas that it would take to perform the same service, it becomes apparent that the Edison apparatus in use in the United States is greater than that of the entire combined gas plant in New York City. Accompanying the letter is a circular illustrating the various types of machines used in the Edison system, also views of the different shops and offices occupied by the company. A diagram is introduced showing the yearly increase of the Edison incandescent light during the past five years.

THE ROOF of the substantial building which Trinity Corporation are erecting on Church street, New York, extending from Vesey to Fulton streets, is being finished in a manner that speaks well for its durability and fire-proof qualities. Between the rafters which support the roof porous terra-cotta is being placed, and over this slate is being laid. The filling between the rafters is so managed as to protect the woodwork, while the slate lays tight against the bed provided for it, thus insuring lasting qualities, freedom from breaking, and other annoyances peculiar to slate roofs.

EDWARD M. HEALY, No. 202 East Seventeenth street, New York, general agent for Wm. H. Haight, of Minneapolis, Minn., is directing attention to Haight's roof chart, which is adapted for buildings where wall plates are at right angles. The chart, by an ingenious arrangement of lines and figures, gives at a glance the lengths of common rafters for various pitches of roofs and for various widths of buildings. It also gives the length of hip and valley rafters, with cuts and bevels for the same. A rule is likewise presented for describing a hip for a curved roof, and another to find the length of jack rafters. The chart is mounted on a cloth back, and is adapted for hanging after the general style of maps. It is attractive in its general appearance and seems to be of great utility.

WE HAVE RECEIVED from J. E. Bolles & Co., Detroit, Mich., an engraving representing some very handsome veranda and railing work which they have recently executed. The design is by N. J. Platin, architect, of Galveston, Tex., and the work in question has been used upon the residence of Sylvan Blum, of the same city.

THE GURNEY HOT WATER HEATER COMPANY, No. 237 Franklin street, Boston, Mass., offer to the trade a pamphlet and price list descriptive of the Gurney hot-water heater. The statement is made that since May, 1884, 700 of these heaters have been placed in the United States and Canada.

THE STANDARD WOOD TURNING COMPANY call attention to a change in their address from 315 and 317 Washington street to 194 Greene street, Jersey City, N. J.

P. PRYIBIL is directing attention to a line of specialties in wood-working machinery, including jig saws, sandpapering machines, twist turning machines, band saws, &c. Particular attention is directed to an adjustable grooving head for circular saws which he is making.

THE H. W. JOHNS MFG. COMPANY direct attention in another part of this issue to the asbestos boiler coverings which they are supplying the trade. They offer samples and illustrated pamphlet relating to this and other fire-proof materials free by mail.

THE BUTLER HARDWARE COMPANY, No. 18 Warren street, New York, are directing attention to the Universal shutter worker, which they offer as a strong, durable and simple fixture for opening outside blinds and shutters from within the house without raising windows or removing window screens.

CHAS. A. STRELINGER & Co., Detroit, Mich., present in another part of this issue some interesting particulars concerning English tool baskets. A reduced price list is given. They also show a beading and molding tool that will interest many of our readers.

J. G. LEFFINGWELL & Co., No. 266 Greenwich street, New York, whose miter machine we illustrated a short time since, have one of their machines at work in the fair of the American Institute this fall. The machine practically demonstrates its utility for the work for which it has been designed.

WM. JOHNSON, Newark, N. J., is calling attention to Wheeler's saw sets, adapted for use on hand saws, band saws and small saws of whatever kind. Three sizes of the tool are manufactured, adapted for different kinds of saws.

THE SCHENCK ADJUSTABLE FIRE-BACK COMPANY, No. 94 Market street, Chicago, and for whom Louis Falk, No. 771 East 165th street, is the New York agent, is directing attention to Wood's iron storm thresholds. These thresholds are offered to the trade as a secure device for preventing water beating under outside doors.

NICHOLS, BELLAMY & Co., No. 657 Washington street, Boston, Mass., are making a large size of their improved mitre box, an illustration of which appeared in our columns some months since. The new size is known to the trade as No. 6, and is adapted to cutting moldings 6 inches wide and 6 inches deep.

WE HAVE RECEIVED from the Joseph Dixon Crucible Company, whose works and general offices are at Jersey City, N. J, an illustrated catalogue of ther productions. The first article described is pure foliated dry American graphite for use as a lubricator.

Following this are illustrations of packages and descriptions of Dixon's graphite axle grease, Dixon's silica-graphite paint and other similar preparations. Plumbago or graphite crucibles are next illustrated and decribed. Dixon's carburet of iron stove polish is then referred to, after which appears a chapter devoted to Dixon's American graphite pencils. A large number of kinds and qualities are described, with illustrations of the different styles. A number of specialities that are of interest to draftsmen and office men in general are illustrated near the end of the book, including pencil sharpeners, erasive rubbers, &c. Among the illustrations in the phamplet are views of the works in Jersey City and of the graphite mines at Ticonderoga, N. Y. A prominent feature of the book is the references in each chapter to companies and firms employing the different materials.

We have received from London, Berry & Orton, Philadelphia, a copy of their current catalogue of band-saw machines and other specialties. The catalogue is accompanied by a large number of circulars relating to machines and tools which this well-known company manufacture. The first illustration represents a No. 8 band-saw mill, erected in the establishment of J. W. Cooper, Philadelphia. Following it are modifications of the same machine in several different forms. Each illustration is acompanied by carefully prepared letter-press description. Several pages of the catalogue proper are devoted to testimonials in which appear the names of prominent establishments in different parts of the country. One of the most important of these is the register of 15 days' consecutive use of one mill, submitted by the Dodge Mfg. Company, of Mishawaka, Ind. Each of the illustrations, both in the catalogue and in the circulars, is accompanied by a telegraphic symbol which, in addition to being a convenience to those having occasion to order by wire, gives a distinctive character to the company's advertising matter.

The Pioneer Fire-Proof Construction Company, whose office and yard are at the corner of Sixteenth and Clark streets, Chicago, have issued a very attractive poster in colors, illustrating their special line of manufacture. The poster is mounted not unlike an ordinary map, thus making it convenient for hanging against the walls of an office. The specialties of this company are hollow building tile and porous tile for fire-proof floors, walls, partitions, roofs, columns, &c. The illustrations contained in the poster show various applications of the material. There is also a view of the company's office, and likewise the factory, which is located at Ottawa, Ill. One of the illustrations which will most interest the readers of *Carpentry and Building* is an isometrical view showing the construction of a fire-proof building. This virtually includes all the specialties of the company. The hollow-brick casings for wrought-iron floor beams, casings for wrought-iron columns, the hollow brick for partition walls and the method of laying a wooden floor over the fire-proof construction are clearly shown.

The Anderson Foundry and Machine Works, of Anderson, Ind., have just sent us a catalogue illustrating and describing their improved tile and brick machines. A number of engravings are given showing the general arrangement of these machines, accompanied by descriptions and directions for operating them, together with tables of dimensions and other particulars of trade interest. The manufacturers point to the circumstance that, notwithstanding the many competitors at the Southern Exposition at Louisville, Ky., in 1883, they were awarded the first prize for the best brick machines.

Those interested in molding, paneling, carving and dovetailing machinery will find the catalogue issued by the Battle Creek Machinery Company, of Battle Creek, Mich., worthy of examination. While referring to wood-working machinery generally it devotes special attention to the above lines, and presents a large number of illustrations which cannot fail to prove interesting to the reader. In addition to the descriptive particulars the catalogue supplies the customary tables of sizes and prices.

A neat illustrated catalogue and price list of small size lathes and bracket woods, &c., has just been issued by Brush, Moore & Co., Cleveland, Ohio. It supplies descriptive particulars, prices and dimensions, and contains considerable matter likely to prove valuable to those interested in this line of machinery.

Trevor & Co., of Lockport, N. Y., have sent us two new catalogues, one of which will be found to contain information concerning a class of machinery not generally well known. It relates to machinery for turning handles of various forms and is profusely illustrated. Among the machines we find the Trevor self-centering and self-adjusting gauge lathe; also a lathe for horse rake heads and similar heavy turned articles. Another lathe for turning irregular forms, such as turning handles for picks, hammers, spokes, &c.; an automatic handle blank sawing machine, an improved rod and dowel machine, a broom-handle turning and tipping machine and a number of others. Lengthy descriptions are given in a number of instances, enabling the reader to form a thoroughly fair idea of the character of the tools. The second catalogue refers to a number of other specialities in wood-working machinery. It is somewhat more extensive, covering 46 pages, and is also fully illustrated. The engravings are well executed and the matter throughout is attractively arranged.

Another catalogue of wood-working machinery which we have before us is that of the Hoyt & Bro. Mfg. Company, of Aurora, Ill. It is a very extensive publication, embracing over 200 pages, and contains a very large amount of information of interest and value to wood-workers. Nearly all the machines to which reference is made are illustrated, and the descriptions are not only a few lines in length directing attention in a very general way to the subject in hand, but are more than ordinarily complete in their character, and will enable the reader to understand pretty fairly the general arrangement and function of the tools. Something of special interest will be found in the set of drawings and table of specifications of a first-class planing mill which the catalogue contains. The engraving is well executed, showing a general view, a plan and a longitudinal section of the mill, and the particulars, though necessarly very brief, cannot fail to be of some practical value. Accompanying the catalogue is a set of circulars similar in treatment of matter to the main publication.

The addition which has recently been built to the United States Mint in Philadelphia has been roofed with Thorn's sheet-metal tiles, and the appearance of the new building is thereby rendered very attractive. Another prominent building in Philadelphia on which this roofing material has been recently employed is the Union Insurance Building.

Among the attractive exhibits at the American Institute Fair this fall is a cottage-shaped structure decorated with Walter's metallic shingles, and also the new form of shingle recently brought out by the National Sheet Metal Roofing Company, New York City.

We learn that the Globe Iron Roofing Company, of Cincinnati, are about enlarging their manufacturing facilities. They have leased the building adjoining their place of business on the Public Landing, and this with their former capacity will enable them to turn out about 200 squares of roofing daily. The offices have been removed from No. 20 to No. 19, and have been fitted up with excellent taste, employing for the purpose the materials which the company manufacture. The ceilings are covered with different sizes of corrugated iron ranging from $\frac{3}{16}$ inch up to $1\frac{1}{4}$ inches corrugation. The ceiling-work is laid off in panels, the intersections of which are emphasized by rosettes finished in gilt. The side walls are similarly finished, with the exception that larger corrugations are used. A very handsome model of a pitched roof showing the application of the Globe standing-seam roofing is a prominent feature in the office of this company.

George Hayes, No. 71 Eighth avenue, New York, in his exhibition at the American Institute Fair, shows some very handsome samples of the improved sheet-metal shutter which he is at present manufacturing. In his exhibit he also presents samples of his skylight bars.

The Snowden Metallic Shingle Company, McKeesport, Pa, have issued an illustrated circular describing Snowden's metallic shingle, and containing a price list of the same, made in roofing tin, also sheet-iron painted, and of varions roofing sundries. An illustration of this article appeared in our columns a few weeks since.

A low-price steam engine of very small capacity is being put upon the market by C. P. Willard & Co., No. 284 Michigan street, Chicago. It is known as the 2 horse-power Acme engine, and is claimed to meet the requirements of those who need a small safe engine that can be operated without danger by persons not accustomed to the use of steam. The boiler is of plate steel and is provided with automatic feed attachment, automatic safety-valve, and before shipping is tested to double its ordinary working pressure. It is stated that with the ordinary price of coal the cost of running will not cost $1\frac{1}{2}$ cents per horse-power per hour.

The Cortright Metal Roofing Company, Broad and Race streets, Philadelphia, are making several changes in their patent metallic shingle, which, they claim, when finished, will make them equal to any in the market. In a short time they will be ready to place their shingle before the trade in its improved form.

J. S. Thorn, of Philadelphia, is making a number of improvements in his establishment the present fall, more particularly in the shingle department. The cordial welcome with which the Thorn shingle has been received by the trade has given encouragement to the enterprise, and accordingly new machinery is being added for the purpose of largely increasing the output for the coming season. The new appliances are of a character also to cheapen the cost of manufacture, and in addition certain improvements in the shingle itself are in contemplation.

The Snowden Metallic Shingle Company, of McKeesport, Pa., although they have been in business but a short time, have received some generous orders. Since they commenced running we are informed that they have shipped to California 750 squares, to Michigan 450 squares, to Kentucky 290 squares, to Florida 560 squares, to New York 150 squares and to Massachusetts 350 squares. We are informed that the company enjoy very bright prospects for the new year.

## Wooden Bolts.

The following article from an exchange on the subject of wooden bolts will doubtless prove of interest to our readers: "Why do you make so lavish a use of nails in the carpenter-work of our houses, to the exclusion of the honest, old oaken pin? Pull down any building, if it be merely a barn, more than 200 years old, and you will not find a single nail in the original work; rafters and joists were all bolted together so stoutly as almost to defy the tools of the destroyer. Many an old manor barn, when pulled down of late years—as, unfortunately, only too many of them are—have shown itself to have been better built than most palaces are now. There are arguments in the way of economy of time, and so on, in favor of the use of nails in house building, but they are as nothing compared with the solid advantage of using wooden bolts. The iron nails in time canker and rot rafters and floors, but bolts hold them together 'like grim death,' and render a house practicably indestructible."

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